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**DRAFT FINAL SITE INSPECTION WORK PLAN, PRELIMINARY ASSESSMENT,
OTHER AREAS/UTILITIES, VOLUME 2 OF 3 - SITES PA-19, PA-24, PA-32,
PA-36, AND PA-39**

03/31/1992

HARDING LAWSON ASSOCIATES

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Harding Lawson Associates

A Report Prepared for

Installation Restoration Branch, Code 1811
Western Division
Naval Facilities Engineering Command
900 Commodore Drive, Building 101
San Bruno, California 94066

DRAFT FINAL
SITE INSPECTION WORK PLAN: PA OTHER AREAS/UTILITIES
VOLUME II of III: SITES PA-19, PA-24, PA-32, PA-36, AND PA-39
NAVAL STATION, TREASURE ISLAND
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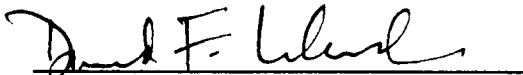
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by



Mark T. Egbert
Project Geologist



David F. Leland, P.E.
Associate Engineer

Harding Lawson Associates
7655 Redwood Boulevard
P.O. Box 578
Novato, California 94948
414/892-0821

Under contract to:

PRC Environmental Management, Inc.
120 Howard Street, Suite 700
San Francisco, California 94105

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1.0 INTRODUCTION

This work plan was developed by Harding Lawson Associates (HLA) under contract to PRC Environmental Management, Inc. (PRC), on behalf of the Department of Navy (Navy), Western Division (WESTDIV), Naval Facilities Engineering Command. The plan was prepared under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62474-88-D-5086, Contract Task Order 0140 (CTO 140). This volume of the work plan describes site inspection (SI) activities to be performed at five preliminary assessment (PA) sites at the Naval Station, Treasure Island, Hunters Point Annex (HPA), San Francisco, California.

The Site Inspection Work Plan comprises three volumes that address all sites identified in the *Preliminary Assessment, Other Areas/Utilities, Naval Station, Hunters Point Annex, San Francisco, California* (PA, Other Areas report; HLA, 1990c) and responses to comments on the report (*Department of Navy, 1991*) as requiring SIs. Volume I addresses underground utilities (Preliminary Assessment Sites PA-45 through PA-50); Volume II addresses sites with available analytical data (PA-19, PA-24, PA-32, PA-36, and PA-39); and Volume III addresses sites with no available analytical data (PA-23, PA-25 through PA-31, PA-33 through PA-35, PA-37, PA-38, PA-40 through PA-44, and PA-51 through PA-58). The five sites addressed in this volume of the work plan, Volume II, are shown on Plate 1.

Although Site PA-19 was recommended for inclusion in the remedial investigation (RI) program in the PA, Other Areas report (HLA, 1990c), upon further investigation of the analytical data during preparation of the sampling plan for the Group 6 sites (HLA, 1991b), Site PA-19 was incorporated into the SI program. Site PA-19 was included in the SI program because chemicals were detected in soil

samples collected by HLA (*HLA, 1988c*) at concentrations near detection limits. These low concentrations do not warrant inclusion in the RI program.

In the remainder of this section, the development of Operable Units, site histories, current site conditions, and the hydrogeologic setting at HPA are described. The sampling program is presented in Section 2.0. Field procedures are described in Section 3.0. The schedule is presented in Section 4.0. References are presented in Section 5.0.

1.1 Background

1.1.1 Development of Operable Units (OUs)

RI activities are proposed or being conducted at 18 sites within HPA as part of the Navy's Installation Restoration (IR) program. The IR sites are currently grouped into five OUs as follows:

<u>Operable Unit</u>	<u>IR Sites</u>
OU I	IR-1/IR-21, IR-2, IR-3
OU II	IR-6, IR-8, IR-9, IR-10
OU III	IR-4, IR-5
OU IV	IR-7
OU V	IR-11, IR-12, IR-13, IR-14, IR-15, IR-17, IR-20, IR-22

Operable Unit V also contains two PA sites (PA-16 and PA-18) that have been investigated in the SI program (*HLA, 1991c*) and 37 other PA sites for which the three SI work plans, including this one, have been prepared. In addition, a work plan for Sites IR-20 and IR-22 was recently prepared (*HLA, 1991b*); these sites are included in OU V.

1.1.2 Site Histories and Current Site Conditions

For the PA sites described in this work plan, Table 1 lists the Navy building names and numbers and previously inventoried chemicals, containers, tanks, transformers, and sumps. Also listed in Table 1 are references for each investigation and summaries of U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), and Navy observations, comments and recommended SI activities. The information presented in Table 1 was compiled from Tables 1 through 4 of the Navy's response to agency comments concerning the PA, Other Areas report (*Department of the Navy, 1991*).

This work plan does not propose to assess the friable asbestos reported in Table 1. The asbestos reported was building insulation and pipe lagging and its presence is being assessed under a separate facility-wide asbestos program. An underground storage tank (UST) program has also been implemented separately.

Site histories are based on HLA's PA, Other Areas report (*HLA, 1990c*), ERM-West's fence-to-fence hazardous materials survey (*ERM-West, 1988*) and information obtained from the Navy. The buildings listed in the following sections at each PA site were recommended for further investigation (*Department of the Navy, 1991*). Other buildings at the sites were not considered for investigation based on review of all available data. Current site and building conditions were assessed by HLA personnel during site visits on October 2, 15 and 30, 1991. Site histories and current conditions are summarized below.

1.1.2.1 Site PA-19

The Officers' Club (Building 901) was a recreational facility for naval officers; currently there are no tenants at this facility. The Officers' Club is on a knoll overlooking the southern and eastern portions of HPA; the building and surrounding

parking area occupy slightly less than one acre (Plate 2). The landscaped parking medians southwest of the Officers' Club are suspected by the Navy of having been filled in part with sandblast waste and oily materials. Common household chemicals were used at this facility.

1.1.2.2 Site PA-24

Buildings 124, 125, 128 and 130, and the asphalt-paved areas adjacent to them, comprise the study area for Site PA-24. Site PA-24 is a 10-acre rectangular site in the north half of HPA, immediately east/northeast of Site IR-10 and adjacent to San Francisco Bay (Plate 3).

Building 124

Building 124 was an acid mixing plant where there were reportedly five aboveground storage tanks containing sulfuric acid and electrolytes. The building was located between Building 123 (IR-10) and Building 134 (PA-25); its former location is shown on Plate 3. The building was demolished and the tanks were removed. There is no documentation of the tank removals.

Building 125

Building 125 was a restaurant called the Submarine Cafeteria, which is no longer in operation. The building is currently leased to a vinegar-making company and a woodworking shop. A photographer and an artist also occupy sections of the building. Two transformers are located just northeast of the building.

Building 128

Miller Pipeline Company currently occupies two shops in the southeast portion of Building 128. Two transformers were present in a room in the east corner of the building; a sign on the door to the room reads "contains PCBs." Previously inventoried

chemicals include oils, solvents, corrosives, and hydrocarbons. The Federal Drug Enforcement Agency (DEA) occupies the larger northwest half of the building and uses it for vehicle impoundment.

Building 130

Building 130 was formerly occupied by Engel Engineering and Protective Finishes Company and now is solely occupied by Protective Finishes. Various chemicals are stored at the site and poor housekeeping practices are evident. Past inventoried chemicals include oils, solvents, paints, volatile organic compounds (VOCs), methyl ethyl ketone (MEK), toluene, and hydrocarbons. Two sumps are located in the building.

1.1.2.3 Site PA-32

Site PA-32, the Regunning Pier and Building 383, is an approximately 8.5-acre site located on the bay in the central portion of HPA (Plate 4). A large crane was constructed on the pier to remove gun turrets from Navy ships during World War II; it is unclear whether the crane was ever used for this purpose. Past activities at the regunning pier include storage of containers of radioactive material from 1950 to 1959 and impact testing of intercontinental ballistic missile launching systems. Impact testing consisted of dropping launching components from a crane onto the pier. A drum containing tar was also reportedly stored at the site. Building 383 was used by the Navy for shipping and receiving and is currently leased to Westinghouse. The regunning pier has been cleared of debris and equipment; no staining was observed during site visits.

1.1.2.4 Site PA-36

Site PA-36 occupies approximately 17 acres in the west-central portion of HPA (Plate 5). Eight buildings, their surrounding areas, and an area west of Building 405 comprise Site PA-36. Releases have been reported as areas of staining at five of the

building locations at the site (Table 1). Poor housekeeping by some tenants at the site is evident.

Building 371

Building 371 is a storage facility for the Circosta Iron Company. Mechanical equipment and debris are strewn north, east, and south of the site. It is unclear whether the equipment and debris belong to Circosta Iron or Wagner Construction, which occupies Building 704, north of Building 371. No releases have been reported at this building site (*HLA, 1990c*), although recent HLA visits to the site indicate staining in the vicinity of the building.

Building 400

Building 400, formerly known as the SOAP storehouse, is currently used by the Navy Planning and Engineering for Repairs and Alterations, Pacific Office (PERA), as a storage area for miscellaneous parts from decommissioned naval ships and as a holding area for other miscellaneous equipment. Past investigations indicated staining on the floor of the building and adjacent to the building site (*ERM-West, 1988*). Oils, polychlorinated biphenyls (PCBs), and acetylene were used or stored at the site.

Building 404A

This building is occupied by Shamrock Enterprises, retail vendors of nuts and bolts. The only chemicals observed at the site were propane and paints. No releases have been reported at this building site.

Building 405

This building is occupied by Clean Comp, Inc., formerly known as Miracle Mushroom. Mushrooms have not been grown there for over a year. The tenants currently rent farm equipment for offsite soil bioremediation operations. The equipment

is stored in and adjacent to the building. Solvents, hydrocarbons, oil, formaldehyde, and chlorine were used or stored at the building site.

Building 406

The northwest quarter of Building 406 is occupied by Mike's Repair; B & A Body Works and Towing occupies the southeast half of the building. The rest of the building is used for automobile storage. Solvents, hydrocarbons, and various other chemicals have been used or stored at this site. Ground surface staining was reported in the parking area between Buildings 406 and 413. Poor housekeeping practices are evident in the building and the surrounding area.

Building 413

Building 413 is currently used to store U. S. Postal Service equipment. Previously inventoried chemicals include oil and sludge. In addition, several drums were previously inventoried at the site. Staining was reported between Buildings 413 and 414; this staining is reported in Table 1 as a release common to both buildings. Currently there are several drums on the north side of Building 413; one of them appears to be leaking.

Building 414

Building 414 currently houses drums containing the soil cuttings from current SI and RI activities. The building has a dirt floor. Fuel oils were reportedly stored at this building. Staining has been reported between Buildings 413 and 414, as noted above.

Building 704

Wagner Construction has occupied this building since February 1983 and uses the surrounding area for heavy equipment storage. Trucks and other equipment are repaired in the building. Releases have been reported at the site (Table 1). Poor housekeeping

practices and several areas of ground staining were observed during recent HLA site visits. In addition, miscellaneous debris, scrap metal, and leaking mechanical equipment were observed at the site.

The Area West of Building 405

The area west of Building 405 lies between Building 405 and Site IR-5 (Plate 5). This approximately 1-acre area includes Building 710, a latrine in the southeast corner of the site. Metal, rubber, wood, empty and damaged drums and cans, and other debris have been dumped onsite. No releases have been reported.

1.1.2.5 Site PA-39

Site PA-39 is a long, narrow northwest-southeast-trending site occupying approximately 4 acres immediately south and west of Site PA-36 (Plate 6). The site is bisected by Site IR-13. Buildings 505, 524 and 707 and their surrounding areas originally comprised Site PA-39; however, Building 524 has been incorporated into Site IR-13; no SI activities are proposed at this building. Buildings 505 and 707 are vacant. No releases have been reported at Site PA-39 (Table 1).

Building 505 (Navy Exchange)

Building 505 was known as the Navy Exchange; it is no longer in operation. The building housed a bowling alley, gymnasium, laundromat, and kitchen. No chemicals have been inventoried; three transformers are present at the site. No releases have been reported.

Building 707

Building 707 was formerly leased to Pet Express for use as an animal clinic. No chemicals have been inventoried; however, five 55-gallon drums are currently stored at the northwest corner of the building. Labels on the drums indicate they contained

detergent used at the clinic as disinfectant and for odor control. The drums are mostly empty and do not appear to have leaked. Several rooms in Building 707 are littered with soiled rags, paint cans, and other containers. No releases have been reported at the site.

1.2 Geology and Hydrogeology of HPA

Five geologic units underlie HPA, the oldest of which is bedrock of the Franciscan Formation. The bedrock is overlain in some low-lying areas by undifferentiated sedimentary deposits of consolidated sands and clays, which are in turn overlain by a relatively extensive bay mud unit consisting of soft, organic plastic clay and silt with interbedded lenses of sand and peat. In some areas of HPA, the bay mud is overlain by poorly graded sands and silty sands designated as the undifferentiated upper sand unit (*HLA, 1991c*). These sands may be native or hydraulically deposited during the construction of HPA. In most areas of HPA, artificial fill has been placed over one or more of these units. This artificial fill consists of two types of material: (1) bedrock-derived fill from upland areas at HPA, and (2) industrial fill consisting of sandblast materials, industrial waste including construction debris, and some domestic waste.

To date, two aquifer zones have been defined at HPA, the uppermost aquifer zone (A-aquifer) and the undifferentiated aquifer zone (B-aquifer). The A-aquifer is defined as saturated fill materials and undifferentiated upper sand deposits that overlie the bay mud deposits. The A-aquifer is generally unconfined to semiconfined with depths to groundwater ranging from 2 to 12 feet below ground surface (bgs). The B-aquifer, the undifferentiated aquifer zone, consists of undifferentiated sedimentary deposits underlying the bay mud deposits above the Franciscan bedrock. Only limited data on the undifferentiated aquifer zone are currently available.

These two aquifer zones are separated by the bay mud deposits over the majority of the site. The bay mud deposits, which range from less than 5 to approximately 60 feet in thickness, act as an aquitard between the two aquifer zones.

Groundwater flow directions at HPA are not well understood. Local flow directions may be quite complex because of heterogeneity in the hydraulic properties of subsurface fill materials, tidal influences, influences of the sanitary sewer systems, and variations in topography. In some areas, local groundwater flow directions have been observed to vary temporally with tidal fluctuation and localized groundwater recharge from storm events.

2.0 SAMPLING PROGRAM

Section 2.1 describes the objectives for this SI and Section 2.2 describes the general soil and groundwater sampling approaches. Section 2.3 presents the site sampling plans for each PA site, including a review of existing analytical data, identification of data gaps, and the proposed sampling plans. In general, no borings or monitoring wells are proposed in areas where RI activities are being performed within PA site boundaries. The general analytical approach is described in Section 2.4.

2.1 Objectives

The objectives of the SI at each site are to:

- Identify the chemicals that may be present in soil and/or groundwater;
- Determine whether a significant release of one or more chemicals into the environment (soil and/or groundwater) has occurred;
- Evaluate groundwater flow direction and gradient at Sites PA-24, PA-36, and PA-39;
- Identify additional possible sources of environmental contamination;
- Further identify possible migration pathways and potential receptors for contaminants;
- Further assess potential public health threats; and
- On the basis of the results for the SI at each site, assess whether each site should be included in the RI program.

2.2 Sampling Approaches

2.2.1 Soil Sampling Approach

Collection and laboratory analysis of soil samples from borings are proposed at each PA site to provide soil chemistry data and to evaluate the potential for chemical transport from soils to underlying groundwater. Soil borings will be located in areas where existing soil chemistry data indicate possible releases have occurred, areas where

the ground surface is stained, and areas of potential contamination (i.e., near sumps and chemical storage areas). Additional soil boring samples will be collected in adjacent onsite areas to identify other potential sources of contamination. Soil borings not completed as monitoring wells will be drilled to the water table; soil samples will be collected at the surface and every 2.5 feet below the ground surface to the water table. One additional soil sample will be collected immediately below the water table during drilling of monitoring wells.

2.2.2 Groundwater Monitoring Approach

Groundwater monitoring wells are proposed at Sites PA-24, PA-32, PA-36, and PA-39 to assess groundwater chemistry. In addition, the water level elevation data from monitoring wells installed at Sites PA-24, PA-36, and PA-39 will be used with data from wells at adjacent sites to evaluate groundwater flow direction and gradient.

Initially, one round of groundwater sampling and water-level monitoring will be performed for each well.

2.3 Site Sampling Plans

In developing the site-specific sampling program for each PA site, existing analytical data were evaluated to identify data gaps by assessing:

- o The potential presence of chemicals in the soil;
- o Whether the concentrations and distribution of chemicals in the soil are indicative of a release;
- o Whether the previous analytical program was comprehensive enough to identify all potential chemicals at each site; and
- o Whether metals in soil were present in concentrations significantly above background levels.

Results of metals analyses were compared to results presented in the Background Sampling Plan (*HLA, 1990b*) (Table 2). Because background metals data are preliminary, they were used for comparison only, not for selecting sample locations or analytical approach. This section presents the existing data from previous investigations, identified data gaps, and the sampling program proposed for each PA site.

2.3.1 Site PA-19

2.3.1.1 HLA Investigation - 1988

The landscaped parking medians in front of the Officers' Club (Building 901) are suspected by the Navy of having been filled in part with sandblast waste and oil materials. Three soil samples (OC01, OC02, and OC03) were collected by HLA in May 1988 from the medians (*HLA, 1988c*); sampling locations are shown on Plate 2. Samples OC01 and OC02 were collected from 6 to 12 inches below ground surface (bgs); Sample OC03 was composited from two sampling locations approximately 12 inches bgs.

The three soil samples collected from the parking medians in front of the Officer's Club were analyzed for semivolatile organic compounds (EPA Test Method 8270), organochlorine pesticides and PCBs (EPA Test Method 8080), total petroleum hydrocarbons (TPH; EPA Test Method 3550/8015), and the CAM metals (EPA Test Methods 7040, 6010, 7080, 7090, 7470, and 7840). Metals were detected in each sample. PCB 1254 [0.7 milligrams per kilogram (mg/kg)] and an unidentifiable oil compound were detected in composite sample OC03. Table 3 presents the detected analytes (metals, TPH, and PCBs) from the Officers' Club soil samples. No other analytes were detected. Arsenic and lead may occur in soil at concentrations above background levels.

2.3.1.2 Data Gaps

The following data gaps will be addressed in the SI for Site PA-19:

- The presence, concentrations, and distribution of Aroclor 1254 and other organic chemicals in soil;
- Occurrence of some metals in soil at concentrations above background levels;
- Presence of sandblast waste in the medians or beneath adjacent parking lots;
- Depth to bedrock; and
- Occurrence of saturated conditions above shallow bedrock.

2.3.1.3 Sampling Plan

The soil in the parking medians previously investigated by HLA and the soil beneath the adjacent asphalt-paved parking lot will be investigated. Proposed soil boring locations are shown on Plate 2, and the rationale for each activity is summarized in Table 4. No monitoring wells are proposed for Site PA-19 because it is situated on the highlands where bedrock is expected to be encountered only a few feet below the ground surface; no saturated soils are anticipated. However, if groundwater is encountered at Site PA-19, one boring may be completed as a monitoring well. The following activities are recommended for Site PA-19.

- Perform geophysical survey to clear boring locations for underground utilities before drilling.
- Drill and sample seven soil borings to bedrock, to an expected maximum depth of approximately 10 feet bgs. Groundwater is not expected to be present beneath this site; however, if groundwater is encountered, a monitoring well may be installed and a groundwater sample collected.

2.3.2 Site PA-24

2.3.2.1 EMCON Investigation - 1987

Four shallow borings (BB2-3, BB2-6, BB2-7, and BB2-9) were drilled by EMCON (*EMCON, 1987*) within the boundary of Site PA-24; another boring (BB2-2) was located just outside the site boundary northwest of Building 125 (Plate 3). The borings were drilled to depths of approximately 5 feet bgs; soil samples were collected for analysis from 2 feet bgs.

A summary of the analytical results is presented in Table 5. Samples from Borings BB2-2 and BB2-7 were analyzed for SOC and metals. Twenty SOC compounds were identified in the soil samples. Soil samples from each boring were analyzed for asbestos; manmade asbestos fibers were detected in soil collected from Borings BB2-3 and BB2-7.

2.3.2.2 HLA Investigation 1988-1991

The primary and contingency phases of the RI at OU II Site IR-10 have included drilling and sampling six monitoring wells and two soil borings within the Site PA-24 boundary (Plate 3). Soil samples have been collected from both borings and monitoring well boreholes; groundwater samples have been collected from the monitoring wells.

The organic and inorganic analytical results from soil samples are summarized in Tables 6 and 7, respectively; results from groundwater samples are summarized in Tables 8 and 9 (*HLA, 1991a*). Low concentrations of SOC, VOC, TPH as diesel, and total oil and grease (TOG) were detected in the soil and groundwater samples. Hexavalent chromium was detected in one soil sample. A number of metals were detected in soil samples; some metals may be present at concentrations above

background, based on comparison to preliminary estimates of background (Table 2 and *HLA, 1990b*).

2.3.2.3 Data Gaps

The following data gaps will be addressed in the SI for Site PA-24:

- Potential presence, concentrations, and distribution of organic chemicals in soil and groundwater;
- Occurrence of manmade asbestos in soil;
- Occurrence of metals in soil above background concentrations; and
- Groundwater flow direction and gradient.

2.3.2.4 Sampling Plan

The SI activities at Site PA-24 will include investigation of the soil and groundwater adjacent to previously sampled EMCON borings, beneath two sumps, adjacent to buildings, and in areas of observed staining. Proposed soil boring locations are shown on Plate 3. The rationale for each activity is summarized in Table 10. The following activities are recommended for Site PA-24:

- Perform geophysical survey to clear boring and monitoring well locations for underground utilities before drilling.
- Drill and sample ten soil borings to the water table at a maximum depth of approximately 6 to 10 feet bgs. Two of the borings, Borings SS01 and SS02, will be drilled through the bottom of sumps inside Building 130.
- Drill and install three monitoring wells. The entire shallow aquifer unit will be screened up to a maximum screen length of 20 feet. The wells will be developed and one round of sampling performed; water levels will be measured.

2.3.3 Site PA-32

2.3.3.1 EMCON Investigation - 1987

Three shallow borings (BE2-1, BE3-6 and BF2-2) drilled by EMCON (*EMCON, 1987*) are within the boundary of Site PA-32 (Plate 4). The borings were

drilled to depths of approximately 5 feet bgs; soil samples were collected from 2 feet bgs for analysis.

A summary of analytical results is presented in Table 11. The samples from Borings BE3-6 and BF2-2 were analyzed for SOC's. Nine SOC compounds were identified in these soil samples. Asbestos was not detected in soil samples and metals concentrations were within preliminary background levels.

2.3.3.2 Data Gaps

The following data gaps will be addressed in the SI for Site PA-32:

- o Potential presence, concentrations, and distribution of organic chemicals in soil and groundwater; and
- o Occurrence of metals in soil above background concentrations.

2.3.3.3 Sampling Plan

Soil and groundwater adjacent to the previous EMCON borings, Building 383, and a sump near Building 383 will be investigated. Proposed sampling locations are shown on Plate 4. Because Site PA-32 is on a pier, the shallow aquifer is expected to be in direct communication with the bay. One well is proposed at Site PA-32 to monitor groundwater chemistry. The rationale for each activity is summarized in Table 12. The following activities are recommended for Site PA-32:

- o Perform geophysical survey to clear borings and monitoring well locations for underground utilities before drilling.
- o Drill and sample four soil borings to the water table at a maximum depth of approximately 6 to 10 feet bgs.
- o Drill and install one monitoring well. The entire aquifer unit will be screened up to a maximum screen length of 20 feet. The well will be developed and one round of sampling performed; the water level will be measured.

2.3.4 Site PA-36

2.3.4.1 PSC Associates Investigation - 1987

Five borings (B-1, B-2, B-3, B-4, and B-5) drilled by PSC Associates (PSC, 1987) are within the boundary of Site PA-36 near Buildings 400 and 405 (Plate 5). The borings were drilled to depths ranging from 11.5 feet bgs (Boring B-3) to 87 feet bgs (Boring B-4). One soil sample was collected within the upper 5 feet of each boring for chemical analysis.

Each soil sample was analyzed for TPH, priority pollutant metals, and asbestos; results are presented in Table 13. TPH as gasoline was detected in the soil sample collected from Boring B-5 at a concentration of 9 parts per million (ppm). No asbestos was detected in soil samples. Metals concentrations are generally similar to available estimates of background levels.

2.3.4.2 EMCON Investigation - 1987

Ten shallow borings (AD4-14, AD4-19, AD4-21, AD4-22, AE4-2, AE4-4, AE4-5, AE4-7, AE4-8, and BE3-1) drilled by EMCON (EMCON, 1987) are within the boundary of Site PA-36 (Plate 5). The borings were drilled to depths of approximately 5 feet bgs; soil samples were collected at 2 feet bgs. All 10 soil samples were analyzed for asbestos; 9 of the 10 were also analyzed for metals and SOCs; the samples from Borings AD4-19 and AD4-22 were analyzed for VOCs.

A summary of the analytical results is presented in Table 14. Toluene and acetone were identified in the soil sample from Boring AD4-19 at concentrations of 4 and 22 parts per billion (ppb), respectively. Except for Boring AE4-2, at least one SOC compound was detected in each of the nine soil samples analyzed; 18 SOCs were detected.

Naturally occurring chrysotile asbestos concentrations in soil samples ranged from below detectable levels to 10 percent (Table 14). Lead concentrations in soil may be above estimated background levels (Table 2).

2.3.4.3 Data Gaps

The following data gaps will be addressed in the SI for Site PA-36:

- o Potential presence, concentrations, and distribution of chemicals in soil and groundwater;
- o Occurrence of metals in soil above background concentrations; and
- o Groundwater flow direction and gradient.

2.3.4.4 Sampling Plan

The SI activities at Site PA-36 will include investigation of the soil and groundwater adjacent to previously sampled EMCON borings, adjacent to buildings identified for investigation, in open lots identified for investigation, adjacent to transformers and vaults, and in areas of observed ground staining. Proposed soil boring locations are shown on Plate 5. The rationale for each activity is summarized in

Table 15. The following activities are recommended for Site PA-36:

- o Perform geophysical survey to clear boring and monitoring well locations for underground utilities before drilling.
- o Drill and sample 30 soil borings to the water table at a maximum depth of approximately 10 to 15 feet bgs.
- o Install seven monitoring wells. The entire aquifer unit will be screened up to a maximum screen length of 20 feet. The wells will be developed and one round of sampling performed; water levels will be measured.

2.3.5 Site PA-39

2.3.5.1 EMCON Investigation - 1987

Four shallow borings (AE4-1, AE4-9, AE3-2, and AE3-5) drilled by EMCON (*EMCON, 1987*) are within the boundary of Site PA-39 (Plate 6). In addition, Borings

AD4-15, AD4-16, and AE3-6 were drilled adjacent to the site boundary. The borings were drilled to depths of approximately 5 feet bgs; soil samples were collected from a depth of 2 feet bgs. All seven soil samples were analyzed for metals, asbestos, and SOC; the samples from Borings AE3-5 and AE4-9 were analyzed for VOCs.

A summary of analytical results is presented in Table 16. Toluene, 1,1,3-trimethylcyclohexane and two unknown VOCs were identified in the soil sample from Boring AE4-9 at concentrations of 3, 7, 5, and 6 ppb, respectively. Toluene was detected in the soil sample from Boring AE3-5 at a concentration of 3 ppb. One SOC compound, bis(2-ethylhexyl)phthalate, was detected in each soil sample; 15 other SOC compounds were also detected in the soil samples.

Naturally occurring chrysotile asbestos concentrations in soil samples ranged from not detected to 10 percent (Table 16). Metals concentrations appear to be consistent with preliminary estimates of background levels.

2.3.5.2 HLA Investigation - 1991

RI activities being performed at Site IR-13, which bisects Site PA-39 (Plate 6), included completion of 10 soil borings and installation of three monitoring wells. Data from these activities are not currently available. The monitoring well locations are shown on Plate 6. Chemical and hydrogeological data collected from these borings and monitoring wells will be evaluated to assess soil and groundwater chemistry related to Site PA-39 and assist in evaluating subsurface conditions at Site PA-39.

2.3.5.3 Data Gaps

The following data gaps will be addressed in the SI for Site PA-39:

- o Potential presence, concentrations, and distribution of chemicals in the soil and groundwater;
- o Occurrence of metals in soil above background concentrations; and

- Groundwater flow direction and gradient.

2.3.5.4 Sampling Plan

The SI activities at Site PA-39 will include investigation of the soil and groundwater adjacent to previously sampled EMCON borings and adjacent to buildings identified for investigation. Proposed soil boring locations are shown on Plate 6. The rationale for each activity is summarized in Table 17. The following activities are recommended for Site PA-39:

- Perform geophysical survey to clear boring and monitoring well locations for underground utilities before drilling.
- Drill and sample seven soil borings to the water table at a maximum depth of approximately 10 to 15 feet bgs.
- Drill and install three monitoring wells. The entire aquifer unit will be screened up to a maximum screen length of 20 feet. The wells will be developed and one round of sampling performed; water levels will be measured.

2.4 General SI Analytical Approach

A general SI analytical approach was developed for all soil and groundwater samples collected during activities described in this SI work plan. The rationale for this sampling approach is based on the following: (1) the inventoried list of chemicals presented in Table 1, (2) limited knowledge of site history of Navy activities and activities prior to Navy occupation of the facility, (3) the incomplete nature of analytical programs of past investigations, and (4) the potential for contamination from past activities. Therefore, a full suite of analyses will be performed for each soil and groundwater sample collected from each site, except for samples collected from PA-19. Because no industrial activities are known to have occurred at or near PA-19, the presence of VOCs, hexavalent chromium, and cyanide is not anticipated. Therefore,

analysis for these chemicals is not proposed for samples from PA-19. The following analyses will be performed on each sample:

- CLP VOCs;
- CLP SOCs;
- CLP PCBs/Pesticides;
- Priority Pollutant Metals, including barium, cobalt, molybdenum and vanadium (CLP Methods);
- Hexavalent Chromium;
- CLP Cyanide;
- TPH as gasoline and diesel; and
- Total oil and grease.

In addition, because asbestos has been detected in shallow soils throughout the site, soil samples collected from the upper 5 feet in borings and monitoring wells will be analyzed for asbestos. Metals analyses of soil and groundwater samples will not include the following common metals: aluminum, calcium, iron, magnesium, manganese, potassium, and sodium.

Radiation monitoring of soil and groundwater samples will include field screening for beta and gamma radiation. In the event that field screening detects levels of radiation above background (47.2 μ R/hr for beta and 10,475 counts per minute for gamma [*HLA, 1990a*]), the sample will be submitted for laboratory analysis for gross alpha, beta, and gamma radiation as well as for radionuclide identification. Field screening criteria may be revised pending radiation survey results and recommendations to be submitted to the regulatory agencies in April 1992.

Field measurements for pH, temperature, conductivity and turbidity will be recorded for all groundwater samples collected. Soil pH will be measured by the

laboratory. All laboratory analyses will be performed by a laboratory certified by the State of California and by the Navy (through the Naval Energy and Environmental Support Activity [NEESA]) for the analyses requested. The number of samples to be analyzed, the sample media, and analytical methods to be used are summarized in Table 18.

The detection limit goals for soil and groundwater samples are summarized in Table 2 of the QAPjP (*HLA, 1988b*). As stated in Section 13.0 of the QAPjP (*HLA, 1988b*), "The actual detection limits obtained during chemical analysis will vary depending on instrument sensitivity and matrix effects. The actual detection limits will be reported by the laboratories."

3.0 FIELD PROCEDURES

Planned sampling activities for the SI at each PA site include:

- Conducting geophysical surveys for borehole clearance;
- Drilling and sampling soil borings;
- Installing, developing, and sampling groundwater monitoring wells; and
- Monitoring water levels.

These field activities will be conducted as generally described in the HPA QAPjP (*HLA, 1988b*), HPA Site Safety Plan (*HLA, 1988a*), and in Section 4.0 of the Group II Sampling Plan (*HLA, 1988d*). Field procedures, decontamination procedures, QA/QC procedures, and the Site Safety Plan are described below.

3.1 Geophysical Surveys

A geophysical survey will be conducted at each PA site. Both ground penetrating radar (GPR) and electromagnetic (EM) surveys will be performed to identify the presence of subsurface utilities prior to drilling. These geophysical techniques are useful noninvasive methods for characterizing the site before drilling. The procedures for these geophysical methods are described in Sections 5.2.1 and 5.2.2 of the QAPjP (*HLA, 1988b*).

3.2 Drilling and Sampling of Soil Borings

Borings will be drilled using a hollow-stem auger drill rig in accordance with the procedures described in Sections 6.1, 6.2, and 6.3 of the QAPjP (*HLA, 1988b*).

Soil samples will be collected and soil chemistry evaluated to the approximate depth of the water table at each site. Soil samples from each boring (including those drilled for monitoring wells) will be collected between 0.5 and 1.0 foot bgs and at 2.5-foot intervals to the water table, at an estimated depth of 10 feet bgs. Soil borings

will be terminated at the water table. At monitoring well locations, additional soil samples will be collected immediately below the water table and at 5-foot intervals to the total depth of the well borehole. Soil samples will be collected using a split-barrel sampler lined with stainless steel sample tubes as described in Section 7.2 of the QAPjP (HLA, 1988b). Electrical tape will not be used to seal the plastic caps to the ends of the stainless steel tubes. Instead, the plastic caps will be lined with Teflon disks prior to placing the caps on the ends of the sample tubes.

Soil samples collected above the water table in soil borings and one soil sample collected immediately below the water table for monitoring wells will be submitted for laboratory analysis. Additional soil samples collected at monitoring well locations will be used for lithologic classification only. If groundwater is encountered during the drilling and sampling of a boring, the depth at which saturated conditions are encountered will be recorded.

All borings will be backfilled with a mixture of neat cement and approximately 5 percent bentonite. The calculated and actual volume of grout used for backfilling borings will be recorded. Soil produced during drilling operations will be containerized and properly disposed (Section 10.2 of the QAPjP [HLA, 1988b]).

3.3 Installation and Sampling of Monitoring Wells

At selected locations, single-cased groundwater monitoring wells will be installed in borings drilled using the hollow-stem auger method. The wells will be used to monitor groundwater in the uppermost shallow aquifer. Monitoring well installation procedures and well construction methods are described in Sections 6.5 and 6.5.1 of the QAPjP (HLA, 1988b). The wells will be constructed of 4-inch-diameter polyvinyl chloride (PVC) screen and casing. The screen will extend from a maximum of 5 feet

above the water table to either 15 feet below the water table or to the bottom of the shallow aquifer, whichever is less. The minimum depth of the surface seal will be 3 feet bgs; therefore, where the groundwater table is present at less than 8 feet bgs, the screen will extend less than 5 feet above the water table. The calculated and actual volume of grout, bentonite, and filter pack material used for construction of the wells will be recorded on the drill logs.

Following installation, the wells will be developed as described in Section 6.6 of the QAPjP (*HLA, 1988b*). One sampling round will be conducted at each site and water levels will be monitored in accordance with Section 9.1.1 of the QAPjP (*HLA, 1988b*). In addition to the groundwater sampling procedures referenced in Section 8.1 of the QAPjP (*HLA, 1988b*), the turbidity for all groundwater samples collected from monitoring wells will be measured. If free product is encountered, the thickness of that layer will be measured in accordance with Section 8.2 of the QAPjP (*HLA, 1988b*). Drill cuttings and groundwater produced during monitoring well installation, development and sampling will be containerized, sampled, and properly disposed (Section 10.2 of the QAPjP [*HLA, 1988b*]).

3.4 Sample Numbering System

To enable submittal of blind samples to the laboratory, each sample will be assigned a unique eight-digit number (e.g., 9115C042). The first two digits represent the year the sample is collected (1991), the third and fourth represent the week of the year in which the sample was collected (15th week of 1991), the fifth digit is the designated letter of the sampler (sampling person "C") and the remaining three represent the sequential sample number for the sampling person (C) taken over the life of the project (42nd sample taken at HPA by "C"). This is the only sample number provided to the

chemical laboratory. Sample location, medium, and depth will be recorded in the project record for cross-reference purposes.

3.5 Decontamination Procedures

Decontamination of sampling and drilling equipment will be conducted by washing or steam cleaning (high pressure, hot water wash) in accordance with the procedures described in Section 10.1 of the QAPjP (*HLA, 1988b*). Decontamination of all soil and groundwater sample collection containers (e.g., bailers) will be conducted by washing with phosphate-free detergent and rinsing with distilled, deionized (DI), or clean water, as appropriate. The decontamination water will be containerized along with the liquids produced during well development and sampling; the combined fluids will be sampled and properly disposed (Section 10.2 of the QAPjP [*HLA, 1988b*]).

3.6 QA/QC Procedures

Quality Assurance/Quality Control (QA/QC) procedures followed during the SIs will include calibration of field and laboratory equipment; analysis of field and laboratory QA/QC samples; and data reduction, validation, and reporting, as described in Sections 12.0, 14.0, and 15.0 of the QAPjP (*HLA, 1988b*), respectively. Sample container, handling, and preservation requirements for soil and groundwater samples are summarized in Table 19. The proposed field QC samples and the required laboratory QA/QC samples are summarized in Tables 20 and 21, respectively. The sample custody procedures defined in Section 11.0 of the QAPjP (*HLA, 1988b*) will be followed.

3.7 Site Safety Plan

A hazard potential analysis will be prepared for each site prior to field work. The results of this analysis will be incorporated into site-specific safety plans that will

identify potential safety hazards, personal protective equipment, and safety monitoring procedures for each site. Standard health and safety procedures, described in the HPA Site Safety Plan (*HLA, 1988a*) and in the Health and Safety Program, Revision 1 (*PRC, 1991*), will be followed.

4.0 SCHEDULE

The schedule for SI activities is shown on Plate 7. Field activities, including mobilization, are anticipated to require three months. The general sequence of field activities will be as follows:

- Locate planned borings and wells;
- Clear boring and well locations;
- Drill borings and install wells;
- Develop and sample wells (one round of groundwater sampling);
- Measure water levels; and
- Survey wells and borings.

Field activities will begin at Site PA-19 and continue sequentially through Site PA-39. After completion of the drilling activities, the monitoring wells will be developed and sampled. It is expected that all laboratory data, including cursory validated and full contract laboratory program (CLP) validated data, will be received within 13 weeks of completion of field work. Database management and data interpretation should be completed within approximately 9 weeks after all data and validation reports are received. It is expected to take approximately two months (9 weeks) to complete the draft SI report after data interpretation is completed.

5.0 REFERENCES

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TABLES

Table 1. PA Sites With Available Analytical Data

Site No.	Bldg./ Area No.	Former and Current Tenant Name	Navy Building Title	Previously Inventoried Chemicals	Previously Inventoried Containers	Tanks/Trans & Sumps	Reported Asbestos	Reported Leak/Spill	Investigation References	EPA, DTSC and Navy Recommendations	EPA, DTSC and Navy Observations and Comments
PA-19	901	Officers Club	Commissioned Officers Mess	White powder, asbestos, gas cylinder, cleaner, paint					ERM-West 1988 HLA 1989b	Soil and Groundwater Investigation	
PA-24	124	None	Acid Mixing Plant	Sulfuric Acid Electrolyte		5 tanks			NEESA WESTEC 1984	Inspect Site Sample Soil	No documentation of tank removal Building removed
	125	Kimberly Vinegar Bridenthal Cabinetry	Submarine Cafeteria			2 trans	yes yes		ERM-West 1988 EMCON 1987	Confirm Presence of SOCs in Soil Asbestos Program	Friable Asbestos Friable Asbestos
	128	Miller Pipeline Company	Shop Service & Work Control Center No. 1	Oil, solvents, corrosives hydrocarbons	2 (55) oil 2 (55) waste oil 2 (55) oil residue				ERM-West 1988 EMCON 1987	Confirm Presence of SOCs in Soil Sample Runoff	Contaminated runoff reported
	130	Engel Engineering	Shop Service	Waste oil, hydrocarbons, paints, solvents	7 (55) oil some open		yes yes		ERM-West 1988	Asbestos Program	Friable Asbestos large quantities chemicals in storage
	130	Protective Finishes	Spray Painting Shop	Paints, solvents, TCE, MEK, toluene	4 (55) TCE, MEK toluene		yes yes			Inspect Site	Large quantities chemicals
PA-32	383	--	Title Undetermined						EMCON 1987	Confirm Presence of SOC's in Soil	
	Area XI	--	Regunning Pier						ERM-West 1988 HLA 1991	Sample Vault Contents	
	Regunning Pier Berth 15	--	--	Tar	2 100-gal drums tar	1 sump			ERM-West 1988 HLA 1991	Screen for Radioactivity	Past temporary storage of radioactive waste drums (1950-1959) Utility vault with liquid in bottom. Variable colored pavement. No apparent staining. Sample vault contents. Too few samples. Sample soil.
PA-36	371	S&W Productions Circosta Iron & Metal	Equipment Storage, 9-02 "R" St. by Bldg. 704						ERM-West 1988 EMCON 1987	Sample Soil	EPA (aerial photo) "oil stain west of bldg 371" No stains observed by HLA
	400	--	SOAP Storehouse	Oil, PCBs, Acetylene	1 (12-gal) oil reservoir, 5 bags calcium hypochlorite, & 8 (5-gal) waste oil	1 trans	yes	yes	ERM-West 1988 PSC 1987 EMCON 1987	Sample Leak Areas Asbestos Program	Friable asbestos pile; 6 oil filter canisters leaking; oil reservoir leaking; 2 transformers in storage, 1 leaking; oil filter unit leaking
	404A	Shamrock Enterprises	Storehouse	Propane			yes		ERM-West 1988 HLA 1991	Sample Soil Asbestos Program	Covered open storage area with soil floor. Stored electrical machinery
	405	Clean Comp Inc. Miracle Mushroom	Storehouse	Solvents & hydrocarbons oil, formaldehyde, chlorine	500-gal diesel 200-gal gas 55-gal formaldehyde 55-gal chlorine 55-gal oil				ERM-West 1988	Inspect Floor Drainage	Undetermined floor drainage; probable bacterial waste

Table 1. PA Sites With Available Analytical Data (continued)

Site No.	Bldg./ Area No.	Former and Current Tenant Name	Navy Building Title	Previously Inventoried Chemicals	Previously Inventoried Containers	Tanks/Trans & Sumps	Reported Asbestos	Reported Leak/Spill	Investigation References	EPA, DTSC and Navy Recommendations	EPA, DTSC and Navy Observations and Comments
PA-36 (Continued)	406	Mike's Repair B & A Body Works and Towing Paul's Repair Rick's Auto Body	Storehouse	Unknown liquid waste oil, hydrocarbons, oil oil	55-gal Unknown 6 (55-gal) oil <5 (55-gal) oil		yes yes yes	yes	ERM-West 1988 EMCON 1987	Sample Leak Area Asbestos Program	Outdoor waste oil storage; 2 leaking drums
	413	--	Storehouse and Yard	Oil, oil sludge	16 drums unknown closed 9 drums waste oil closed 1 drum soil closed 25 drums unknown closed 28 drums waste oil damaged 10'x4'x4' vat of oil sludge - open 16 drums new hydraulic closed dumper of drums - oily			yes	ERM-West 1988 EMCON 1987	Sample Stained Soil	Large quantities of oil and waste oils stored; Some damaged drums; Waste oil between bldgs. 413 and 414; Spillage on pallet; oil stained soil (30'x5').
	414	--	Public Works Furniture Storehouse and Yard	Fuel oils		1 trans	yes	yes	ERM-West 1988 EMCON 1987	Sample Spill Area Asbestos Program	Waste stored in yard between 413 and 414 (refer to 413). Some spillage and open containers.
	704	Wagner Construction	Transportation Shop Shelter, S-02	Hydrocarbons, gas, waste oil, solvents, hydraulic, oil batteries, acid	1 drum diesel 1 drum waste oil 5 drum solvent, oil 2 drum oil open			yes	ERM-West 1988 EMCON 1987	Inspect Reservoirs Sample Runoff Sample Stained Area	Open reservoirs; improper storage; many batteries, contaminated runoff stained yard.
	710	--	Latrine						EMCON 1987	Confirm Presence of SOCs in Soil	
	Area IV	--	West of Building 405	Oil Flammable materials	Open & damaged drums and cans				ERM-West 1988 EMCON 1987	Confirm Presence of SOCs in Soil	Most containers are open or damaged.
PA-38	505	--	Navy Exchange		1 drum unknown	3 trans	yes		ERM-West 1988 EMCON 1987	Confirm Presence of SOCs in Soil Asbestos Program	
	524	--	Commissary Storehouse						EMCON 1987	Confirm Presence of SOCs in Soil	Building title suspect
	707	Pet Express	NRDL Animal Colony			3 trans	yes		ERM-West 1988 EMCON 1987	Confirm Presence of SOCs in Soil Asbestos Program	Wet well, friable asbestos

Note: The information presented here was compiled from Tables 1 through 4 of the Navy's response to agency comments the PA Other Areas report (HLA, 1990c).

Table 2. Estimated Upper Limit Concentrations (Threshold) of Background Population

	Entire Dataset	Serpentinite Fill	Non-Serpentinite Fill	Serpentinite Bedrock	0 to 1 Foot Sample Depth	0 to 5 Foot Sample Depth	>5 Foot Sample Depth	TTLc*	STLC**
Population:	n=179	n=86	n=68	n=12	n=19	n=104	n=75		
Metal	Concentration (mg/kg)							mg/kg	mg/l
Arsenic	7	7	6	2.7	4	7	7	500	5
Barium	300	200	220	185	180	280	205	10,000	100
Beryllium	1.3	1.0	1.2	1.1	1.0	1.2	1.2	75	0.75
Cadmium	2.9	2.1	2.9	2.6	2.9	2.9	2.6	100	1.0
Cobalt	210	175	120	200	100	120	220	8,000	80
Chromium	2,750	1,000	800	2,100	600	1,000	1,000	2,500	560
Copper	120	100	120	70	70	75	85	2,500	25
Iron	65,000	55,000	55,000	700,000	45,000	60,000	65,000	—	—
Lead	100	12	28	4	20	20	12	1,000	5
Mercury	—	—	—	—	—	—	—	20	0.2
Manganese	4,000	1,250	2,000	3,520	1,200	2,000	2,000	—	—
Nickel	3,000	3,000	2,400	6,400	2,400	2,500	3,000	2,000	20
Vanadium	100	90	80	50	80	100	100	2,400	24
Zinc	110	100	80	73	90	110	90	5,000	250

Notes:

mg/l = milligrams per liter

mg/kg = milligrams per kilogram

* TTLc = Total Threshold Limit Concentration, Title 22, California Code of Regulations (CCR), Section 66699. Expressed in milligrams per kilogram, wet weight basis (mg/kg)

** STLC = Soluble Threshold Limit Concentration, Title 22, California Code of Regulations (CCR), Section 66699. Expressed in milligrams per liter (mg/l)

Source: HLA, 1990b

Table 3. Summary of Analytical Results for Site PA-19

Sample Matrix	Detection	Sample Designation			
	Limit	OC01	OC02	OC03	OC04
	mg/kg	mg/kg soil	mg/kg soil	(composite) mg/kg soil	(blank) mg/kg soil
<hr/>					
<u>METALS</u>					
Antimony	3.0	ND	ND	ND	ND
Arsenic	2.0	49	69	69	ND
Barium	5.0	150	220	84	ND
Beryllium	0.5	ND	ND	ND	ND
Cadmium	0.3	2.4	2.7	2.7	ND
Chromium (total)	0.5	150	182	190	ND
Cobalt	0.5	25	30	32	ND
Copper	0.5	16	150	157	ND
Lead	3.0	40	41	43	ND
Mercury	0.1	ND	ND	ND	ND
Molybdenum	0.5	7.4	10	10	ND
Nickel	0.5	300	340	360	0.09
Selenium	3.0	77	97	100	ND
Silver	1.0	ND	ND	ND	ND
Thallium	3.0	ND	ND	ND	ND
Vanadium	0.5	33	44	46	ND
Zinc	0.5	47	48	44	0.03
<hr/>					
<u>TOTAL PETROLEUM HYDROCARBONS (TPH)</u>					
TPH, as Gasoline	10	ND	ND	ND	NT
TPH, as Kerosene	10	ND	ND	ND	NT
TPH, as Diesel	10	ND	ND	ND	NT
Other TPH	NA	--	--	*	--
<hr/>					
<u>PCBs</u>					
Aroclor 1254	0.5	ND	ND	0.7	ND

Notes:

- mg/kg = milligrams per kilogram
- ND = Not detected at given detection limit
- NA = Not applicable
- NT = Not tested
- * Contains unidentifiable oil not quantifiable by GC

Sample locations shown on Plate 2

Source: HLA, 1988c

**Table 4. Rationale for Proposed Sampling Locations
Site PA-19**

Location*	Area	Rationale
<u>Test Borings:</u>		
1 through 4	In parking medians	To look for sandblast waste and assess soil chemistry in areas of previous investigation
5 through 7	In parking lot adjacent to medians	To look for sandblast waste beneath parking lot and assess soil chemistry

Notes: Bedrock is expected to be encountered approximately 5 to 10 feet below the ground surface.

Groundwater is not expected to be encountered.

* Proposed boring locations shown on Plate 2.

Table 5. Summary of Analytical Results for Site PA-24

Boring Number	BB2-2	BB2-3	BB2-6	BB2-7	BB2-9
Sample Matrix:	soil	soil	soil	soil	soil
SEMIVOLATILE ORGANIC COMPOUNDS (ppb)					
Bis(2-ethylhexyl)phthalate	470	NA	NA	830	NA
Chrysene	ND	NA	NA	140	NA
Fluoranthene	ND	NA	NA	730	NA
Phenanthrene	ND	NA	NA	470	NA
Benzo(a)anthracene	ND	NA	NA	130	NA
Benzo(b,k)fluoranthene	ND	NA	NA	320	NA
Benzo(g,h,i)perylene	80	NA	NA	170	NA
Benzo(a)pyrene	ND	NA	NA	210	NA
Ideno(1,2,3-cd)pyrene	ND	NA	NA	130	NA
Pyrene	ND	NA	NA	540	NA
Dodecane	100	NA	NA	ND	NA
Hexadecane	260	NA	NA	ND	NA
Nonadecane	200	NA	NA	150	NA
Octadecane	240	NA	NA	340	NA
Pentadecane	180	NA	NA	260	NA
Tetradecane	ND	NA	NA	170	NA
2,6,10,14-Tetra-methylheptadecane	390	NA	NA	470	NA
Undecane	140	NA	NA	ND	NA
Eicosane	200	NA	NA	ND	NA
Heneicosane	240	NA	NA	160	NA
METALS (ppm)					
Chromium	60	NA	NA	130	NA
Copper	42	NA	NA	34	NA
Lead	16	NA	NA	50	NA
Nickel	470	NA	NA	320	NA
Zinc	51	NA	NA	57	NA
ASBESTOS					
% Natural Chrysotile	1 - 10	1 - 5*	1 - 5	1 - 10*	1 - 5

Notes: All concentrations are reported in parts per billion (ppb) or parts per million (ppm), as noted.
 ND = Not detected
 NA = Not analyzed
 * = Asbestos fibers identified as manmade
 Boring locations shown on Plate 3.
 Source: EMCON, 1987

Table 6

Page 1

Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR06MW44A	IR06MW44A	IR06MW44A	IR06MW44A
Sample Depth(feet):	2.25	6.25	11.25	16.25
Sample Number:	9138M192	9138M193	9138M194	9138M195
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/19/91	09/19/91	09/19/91	09/19/91
Lab Sample Number:	0605680001SA	0605680002SA	0605680003SA	0605680004SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	A
Toluene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	A
Chlorobenzene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	A
CLP-SOC									
Naphthalene	ug/kg	NA		NA		NA		NA	
2-Methylnaphthalene	ug/kg	NA		NA		NA		NA	
Dibenzofuran	ug/kg	NA		NA		NA		NA	
Phenanthrene	ug/kg	NA		NA		NA		NA	
TPH DIESEL									
TPH-Diesel	mg/kg	ND (13)	A	ND (12)	A	ND (12)	A	ND (12)	A
OIL & GREASE									
Total Oil & Grease	mg/kg	ND (63)	A	ND (59)	A	ND (62)	A	ND (61)	A
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	ND (25)	A	ND (24)	A	ND (25)	A	ND (24)	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 6
Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

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Station Number:	IR06MW44A	IR06MW44A	IR06MW44A	IR06MW44A
Sample Depth(feet):	21.25	26.25	31.25	36.25
Sample Number:	9138M196	9138M197	9138M198	9138M199
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/19/91	09/19/91	09/19/91	09/19/91
Lab Sample Number:	0605680005SA	0605680006SA	0605680007SA	0605680008SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	VA
Toluene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	VA
Chlorobenzene	ug/kg	ND (6)	A	ND (6)	A	ND (6)	A	ND (6)	VA
CLP-SOC									
Naphthalene	ug/kg	NA		NA		NA		NA	
2-Methylnaphthalene	ug/kg	NA		NA		NA		NA	
Dibenzofuran	ug/kg	NA		NA		NA		NA	
Phenanthrene	ug/kg	NA		NA		NA		NA	
TPH DIESEL									
TPH-Diesel	mg/kg	ND (12)	A	ND (12)	A	ND (12)	A	ND (13)	VA
OIL & GREASE									
Total Oil & Grease	mg/kg	ND (210)	U1J2	ND (60)	A	ND (60)	A	ND (63)	VA
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	ND (23)	A	ND (24)	A	ND (24)	A	ND (25)	VA

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 6
Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR10B006	IR10B006	IR10B006	IR10B006
Sample Depth(feet):	1.75	3.25	4.75	6.75
Sample Number:	8849A033	8849A034	8849A035	8849A036
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/14/88	12/14/88	12/14/88	12/14/88
Lab Sample Number:	2887-1	2887-2	2887-3	2887-4

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	ND (6)	A/U	ND (6)	A/U	ND (6)	A/U	ND (6)	A/U
Toluene	ug/kg	16	AF	6	AF	ND (6)	A/U	ND (6)	A/U
Chlorobenzene	ug/kg	ND (6)	A/U	ND (6)	A/U	ND (6)	A/U	ND (6)	A/U
CLP-SOC									
Naphthalene	ug/kg	ND (390)	A/U	ND (370)	A/U	ND (380)	A/U	ND (400)	A/U
2-Methylnaphthalene	ug/kg	ND (390)	A/U	ND (370)	A/U	ND (380)	A/U	ND (400)	A/U
Dibenzofuran	ug/kg	ND (390)	A/U	ND (370)	A/U	ND (380)	A/U	ND (400)	A/U
Phenanthrene	ug/kg	ND (390)	A/U	ND (370)	A/U	ND (380)	A/U	ND (400)	A/U
TPH DIESEL									
TPH-Diesel	mg/kg	74	A	ND (10)	A/U	ND (10)	A/U	ND (10)	A/U
OIL & GREASE									
Total Oil & Grease	mg/kg	480	A	440	A	ND (250)	A/U	400	A
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	NA		NA		NA		NA	

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 6
Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

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Station Number:	IR10B030	IR10B030	IR10B030	IR10B030
Sample Depth(feet):	2.25	3.75	5.75	11.25
Sample Number:	9138H880	9138H881	9138H882	9138H883
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/20/91	09/20/91	09/20/91	09/20/91
Lab Sample Number:	0605680009SA	0605680010SA	0605680011SA	0605680012SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	NA		NA		NA		NA	
Toluene	ug/kg	NA		NA		NA		NA	
Chlorobenzene	ug/kg	NA		NA		NA		NA	
CLP-SOC									
Naphthalene	ug/kg	NA		NA		NA		NA	
2-Methylnaphthalene	ug/kg	NA		NA		NA		NA	
Dibenzofuran	ug/kg	NA		NA		NA		NA	
Phenanthrene	ug/kg	NA		NA		NA		NA	
TPH DIESEL									
TPH-Diesel	mg/kg	NA		NA		NA		NA	
OIL & GREASE									
Total Oil & Grease	mg/kg	ND (160)	U1	ND (190)	U1	ND (63)	U1	ND (130)	U1
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	ND (25)	A	72	A	26	A	ND (23)	A

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 6
Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR10MW13A2	IR10MW13A2	IR10MW13A2	IR10MW14A
Sample Depth(feet):	0.75	2.75	5.75	2.50
Sample Number:	8850A088	8850A089	8850A090	8901C002
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/20/88	12/20/88	12/20/88	01/04/89
Lab Sample Number:	0450110001SA	0450110002SA	0450110003SA	3026-1

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	ND (5.4)	A/Y	ND (5.7)	A/Y	ND (6)	A/Y	1	A/J
Toluene	ug/kg	ND (5.4)	A/Y	ND (5.7)	A/Y	37	AF/Y	2	AF/J
Chlorobenzene	ug/kg	ND (5.4)	A/Y	ND (5.7)	A/Y	ND (6)	A/Y	ND (6)	A/U
CLP-SOC									
Naphthalene	ug/kg	ND (360)	A/Y	ND (370)	A/Y	ND (390)	A/Y	51	A/J
2-Methylnaphthalene	ug/kg	ND (360)	A/Y	ND (370)	A/Y	ND (390)	A/Y	53	A/J
Dibenzofuran	ug/kg	ND (360)	A/Y	ND (370)	A/Y	ND (390)	A/Y	56	A/J
Phenanthrene	ug/kg	ND (360)	A/Y	ND (370)	A/Y	ND (390)	A/Y	71	A/J
TPH DIESEL									
TPH-Diesel	mg/kg	ND (10)	A	ND (10)	A	ND (10)	A	ND (10)	A/U
OIL & GREASE									
Total Oil & Grease	mg/kg	ND (50)	A	ND (50)	A	ND (50)	A	ND (250)	A/U
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	NA		NA		NA		NA	

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 6
Analytical Results for Organic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR10MW14A	IR10MW29A2	IR10MW29A2	IR10MW29A2
Sample Depth(feet):	4.25	2.75	6.25	11.25
Sample Number:	8901C003	9138H875	9138H876	9138H877
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	01/04/89	09/18/91	09/18/91	09/18/91
Lab Sample Number:	3026-2	0604100008SA	0604100009SA	0604100010SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Trichloroethene	ug/kg	ND (6)	A/U	ND (6)	A	ND (6)	A	ND (6)	VA
Toluene	ug/kg	18	AF	ND (6)	A	ND (6)	A	ND (6)	VJ0
Chlorobenzene	ug/kg	ND (6)	A/U	ND (6)	A	2	A/J	ND (6)	VJ0
CLP-SOC									
Naphthalene	ug/kg	ND (4100)	A/U	NA		NA		NA	
2-Methylnaphthalene	ug/kg	ND (4100)	A/U	NA		NA		NA	
Dibenzofuran	ug/kg	ND (4100)	A/U	NA		NA		NA	
Phenanthrene	ug/kg	ND (4100)	A/U	NA		NA		NA	
TPH DIESEL									
TPH-Diesel	mg/kg	ND (10)	A/U	ND (13)	A	ND (12)	A	ND (12)	VA
OIL & GREASE									
Total Oil & Grease	mg/kg	4800	A	ND (81)	U1	ND (84)	U1	ND (74)	VU1
EPA-418.1									
Total Recoverable Petroleum Hydrocarbons	mg/kg	NA		ND (26)	A	NA		NA	

Notes: Units expressed as micrograms (ug) or milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- F: The presence of this compound is due to suspected field contamination.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J7: Analytical results for this compound are qualified as estimated due to linearity problems in the initial calibration.
- J8: Analytical results for this compound are qualified as estimated due to detection of the compound above the instrument calibration range.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Compound is also detected in the laboratory method blank.
- #,b: Analytical results should not be considered reliable for this common lab contaminant.
- D: Compound is identified in an analysis at a secondary dilution factor.
- E: Concentration exceeds the calibration range of the GC/MS instrument for the specific analysis.
- G: Reporting limit raised due to matrix interference.
- J: Result is detected below the reporting limit or is an estimated concentration.
- j: All reporting limits for this sample raised due to matrix interferences.
- l: If 'l' is attached to a diesel result, then either the hydrocarbons present in this sample represent an unknown mixture at a concentration of less than 45 mg/kg, or the hydrocarbons present in this sample do not fit the diesel pattern, but are found in the diesel range. (Quantification was based upon diesel references.) If 'l' is attached to a gasoline result, then this sample contains late eluting hydrocarbons. Early gasoline peaks are below reporting limits.
- o: Reporting limit raised due to high level of analyte present in sample.

Laboratory Assigned Qualifiers (Continued...)

r: Reporting limit changed due to sample volume limitations.

U: Compound was analyzed but not detected.

X,Y: Specific flag used to properly define the results. Qualifier is fully described in the Sample Data Summary Package and the Case Narrative.

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Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR06MW44A	IR06MW44A	IR06MW44A	IR06MW44A
Sample Depth(feet):	2.25	6.25	11.25	16.25
Sample Number:	9138M192	9138M193	9138M194	9138M195
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/19/91	09/19/91	09/19/91	09/19/91
Lab Sample Number:	918436	918437	918438	918439

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	NA		NA		NA		NA	
CLP-FUAA									
Arsenic	mg/kg	NA		NA		NA		NA	
Lead	mg/kg	NA		NA		NA		NA	
CLP-ICP									
Aluminum	mg/kg	NA		NA		NA		NA	
Barium	mg/kg	NA		NA		NA		NA	
Calcium	mg/kg	NA		NA		NA		NA	
Chromium	mg/kg	NA		NA		NA		NA	
Cobalt	mg/kg	NA		NA		NA		NA	
Copper	mg/kg	NA		NA		NA		NA	
Iron	mg/kg	NA		NA		NA		NA	
Magnesium	mg/kg	NA		NA		NA		NA	
Manganese	mg/kg	NA		NA		NA		NA	
Nickel	mg/kg	NA		NA		NA		NA	
Vanadium	mg/kg	NA		NA		NA		NA	
Zinc	mg/kg	NA		NA		NA		NA	
EPA-7196									
Chromium VI	ug/kg	ND(50)	A	ND(50)	A	ND(50)	A	ND(50)	A
EPA-9045									
pH	ph	7.4	A	7.6	A	7.9	A	7.4	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 7
Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR06MW44A	IR06MW44A	IR06MW44A	IR06MW44A
Sample Depth(feet):	21.25	26.25	31.25	36.25
Sample Number:	9138M196	9138M197	9138M198	9138M199
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/19/91	09/19/91	09/19/91	09/19/91
Lab Sample Number:	918440	918441	918442	918443

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	NA		NA		NA		NA	
CLP-FUAA									
Arsenic	mg/kg	NA		NA		NA		NA	
Lead	mg/kg	NA		NA		NA		NA	
CLP-ICP									
Aluminum	mg/kg	NA		NA		NA		NA	
Barium	mg/kg	NA		NA		NA		NA	
Calcium	mg/kg	NA		NA		NA		NA	
Chromium	mg/kg	NA		NA		NA		NA	
Cobalt	mg/kg	NA		NA		NA		NA	
Copper	mg/kg	NA		NA		NA		NA	
Iron	mg/kg	NA		NA		NA		NA	
Magnesium	mg/kg	NA		NA		NA		NA	
Manganese	mg/kg	NA		NA		NA		NA	
Nickel	mg/kg	NA		NA		NA		NA	
Vanadium	mg/kg	NA		NA		NA		NA	
Zinc	mg/kg	NA		NA		NA		NA	
EPA-7196									
Chromium VI	ug/kg	ND (50)	A	ND (50)	A	ND (50)	A	ND (50)	A
EPA-9045									
pH	ph	7.9	A	8.8	A	8.1	A	7.8	VA

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 7
Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
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Station Number:	IR10B006	IR10B006	IR10B006	IR10B006
Sample Depth(feet):	1.75	3.25	4.75	6.75
Sample Number:	8849A033	8849A034	8849A035	8849A036
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/14/88	12/14/88	12/14/88	12/14/88
Lab Sample Number:	2887-1	2887-2	2887-3	2887-4

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	0.13	A	ND(0.05)	A/U	ND(0.05)	A/U	ND(0.05)	A/U
CLP-FUAA									
Arsenic	mg/kg	5.45	J2/N	3.81	J2/N	3.1	J2/N	1.63	J2/BN
Lead	mg/kg	6.72	J2/*	6.51	J2/*	4.16	J2/*	3.77	J2/*
CLP-ICP									
Aluminum	mg/kg	14171.35	J2/*	19361.13	J2/*	9443.1	J2/*	9419.34	J2/*
Barium	mg/kg	105.99	J2	118	J2	150.58	J2	162.9	J2
Calcium	mg/kg	6700.92	J2/*E	6664.43	J2/*E	1354.09	J2/*E	1392.37	J2/*E
Chromium	mg/kg	425.62	J2/NE	106.14	J2/NE	82.14	J2/NE	126	J2/NE
Cobalt	mg/kg	94.7	A/N*	34.4	A/N*	23.4	A/N*	45.9	A/N*
Copper	mg/kg	67.1	J2/E*	38.1	J2/E*	17.7	J2/E*	17	J2/E*
Iron	mg/kg	42729.12	A/E	35373.23	A/E	23475.15	A/E	20818.76	A/E
Magnesium	mg/kg	101326.32	A	35014.57	A	7916.52	A	10218.66	A
Manganese	mg/kg	1110.05	J2/E	563.77	J2/E	517.7	J2/E	1541.3	J2/E
Nickel	mg/kg	1398.02	J2/*E	170.37	J2/*E	97.68	J2/*E	304.91	J2/*E
Vanadium	mg/kg	37.14	J2	49.09	J2	50.41	J2	44.25	J2
Zinc	mg/kg	ND(67.82)	U1/E	74.83	A/E	ND(34.71)	U1/E	ND(32.31)	U1/E
EPA-7196									
Chromium VI	ug/kg	ND(500)	J5	ND(500)	J5	ND(500)	J5/U	ND(500)	J5
EPA-9045									
pH	ph	7.8	A	8.1	A	7.7	A	7.7	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.
NA: Not Analyzed.
ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

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Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10B006	IR10B030	IR10B030	IR10B030
Sample Depth(feet):	10.25	2.25	3.75	5.75
Sample Number:	8849A037	9138H880	9138H881	9138H882
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/14/88	09/20/91	09/20/91	09/20/91
Lab Sample Number:	2887-5	0605680009SA	0605680010SA	0605680011SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND (0.05)	A/U	NA		NA		NA	
CLP-FUAA									
Arsenic	mg/kg	3.08	J2/N	NA		NA		NA	
Lead	mg/kg	2.99	J2/*	NA		NA		NA	
CLP-ICP									
Aluminum	mg/kg	9751.18	J2/*	NA		NA		NA	
Barium	mg/kg	56.73	J2	NA		NA		NA	
Calcium	mg/kg	2208.06	J2/*E	NA		NA		NA	
Chromium	mg/kg	142.06	J2/NE	NA		NA		NA	
Cobalt	mg/kg	21	A/N*	NA		NA		NA	
Copper	mg/kg	11.2	J2/E*	NA		NA		NA	
Iron	mg/kg	25189.57	A/E	NA		NA		NA	
Magnesium	mg/kg	5239.34	A	NA		NA		NA	
Manganese	mg/kg	331.28	J2/E	NA		NA		NA	
Nickel	mg/kg	227.75	J2/*E	NA		NA		NA	
Vanadium	mg/kg	44.12	J2	NA		NA		NA	
Zinc	mg/kg	ND (32.01)	U1/E	NA		NA		NA	
EPA-7196									
Chromium VI	ug/kg	ND (500)	J5	NA		NA		NA	
EPA-9045									
pH	ph	7.7	A	7.7	A	7.8	A	7.6	A

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 7

Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10B030	IR10MW13A2	IR10MW13A2	IR10MW13A2
Sample Depth(feet):	11.25	0.75	2.75	5.75
Sample Number:	9138H883	8850A088	8850A089	8850A090
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	09/20/91	12/20/88	12/20/88	12/20/88
Lab Sample Number:	0605680012SA	0450110001SA	0450110002SA	0450110003SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	NA		ND(0.11)	A/Y	ND(0.11)	A/Y	ND(0.12)	A/Y
CLP-FUAA									
Arsenic	mg/kg	NA		ND(2.2)	A/Y	4	A/Y	ND(2.4)	A/Y
Lead	mg/kg	NA		ND(1.1)	A/Y	9	A/Y	ND(1.2)	A/Y
CLP-ICP									
Aluminum	mg/kg	NA		1950	A/Y	23200	A/Y	4030	A/Y
Barium	mg/kg	NA		ND(44)	A/Y	150	A/Y	ND(48.2)	A/Y
Calcium	mg/kg	NA		ND(1100)	A/Y	3570	A/Y	ND(1200)	A/Y
Chromium	mg/kg	NA		696	A/Y	160	A/Y	821	A/Y
Cobalt	mg/kg	NA		70	A/Y	20	A/Y	70	A/Y
Copper	mg/kg	NA		10.5	A/Y	25.9	A/Y	13.3	A/Y
Iron	mg/kg	NA		26300	A/Y	32400	A/Y	20300	A/Y
Magnesium	mg/kg	NA		193000	A/Y	40700	A/Y	147000	A/Y
Manganese	mg/kg	NA		908	A/Y	657	A/Y	508	A/Y
Nickel	mg/kg	NA		1500	A/Y	250	A/Y	1400	A/Y
Vanadium	mg/kg	NA		30	A/Y	70	A/Y	30	A/Y
Zinc	mg/kg	NA		18.5	A/Y	55.3	A/Y	12.6	A/Y
EPA-7196									
Chromium VI	ug/kg	NA		ND(100)	J5	ND(1000)	J5	200	J5
EPA-9045									
pH	ph	8.4	A	7.8	J5	7.8	J5	8	J5

Notes:

Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 7
Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

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Station Number:	IR10MW13A2	IR10MW14A	IR10MW14A	IR10MW14A
Sample Depth(feet):	7.75	2.50	4.25	6.75
Sample Number:	8850A091	8901C002	8901C003	8901C004
Matrix:	SOIL	SOIL	SOIL	SOIL
Sample Date:	12/20/88	01/04/89	01/04/89	01/04/89
Lab Sample Number:	0450110004SA	3026-1	3026-2	3026-3

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-CVAA									
Mercury	mg/kg	ND (0.12)	A/Y	0.22	A	0.12	A	0.13	A
CLP-FUAA									
Arsenic	mg/kg	ND (2.4)	A/Y	8.2	A	ND (3.4)	U1	4.3	A
Lead	mg/kg	ND (1.2)	A/Y	8.4	A	4.8	A	6.3	A
CLP-ICP									
Aluminum	mg/kg	1170	A/Y	26600	A	6120	A	24100	A
Barium	mg/kg	ND (48.8)	A/Y	195	A	210	A	437	A
Calcium	mg/kg	ND (1220)	A/Y	9400	A	2980	A	15100	A
Chromium	mg/kg	367	A/Y	370	A	143	A	328	A
Cobalt	mg/kg	80	A/Y	47.3	A	117	A	49.1	A
Copper	mg/kg	ND (6.1)	A/Y	43.9	A	37.3	A	72.5	A
Iron	mg/kg	23600	A/Y	39900	A	36500	A	37500	A
Magnesium	mg/kg	204000	A/Y	75800	A	115000	A	81500	A
Manganese	mg/kg	728	A/Y	869	A	1590	A	1600	A
Nickel	mg/kg	1710	A/Y	620	A	1720	A	679	A
Vanadium	mg/kg	20	A/Y	59.2	A	30.8	A	62.6	A
Zinc	mg/kg	17.7	A/Y	63.1	A	45.8	A	65.7	A
EPA-7196									
Chromium VI	ug/kg	NA		ND (580)	A/U	ND (620)	A/U	ND (630)	A/U
EPA-9045									
pH	ph	7.8	J5	8.3	A	8.1	A	8.2	A

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 7
Analytical Results for Inorganic Compounds Detected in Soil Samples
Soil Borings From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW29A2	IR10MW29A2	IR10MW29A2
Sample Depth(feet):	2.75	6.25	11.25
Sample Number:	9138H875	9138H876	9138H877
Matrix:	SOIL	SOIL	SOIL
Sample Date:	09/18/91	09/18/91	09/18/91
Lab Sample Number:	0604100008SA	0604100009SA	0604100010SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual
CLP-CVAA							
Mercury	mg/kg	NA		NA		NA	
CLP-FUAA							
Arsenic	mg/kg	NA		NA		NA	
Lead	mg/kg	NA		NA		NA	
CLP-ICP							
Aluminum	mg/kg	NA		NA		NA	
Barium	mg/kg	NA		NA		NA	
Calcium	mg/kg	NA		NA		NA	
Chromium	mg/kg	NA		NA		NA	
Cobalt	mg/kg	NA		NA		NA	
Copper	mg/kg	NA		NA		NA	
Iron	mg/kg	NA		NA		NA	
Magnesium	mg/kg	NA		NA		NA	
Manganese	mg/kg	NA		NA		NA	
Nickel	mg/kg	NA		NA		NA	
Vanadium	mg/kg	NA		NA		NA	
Zinc	mg/kg	NA		NA		NA	
EPA-7196							
Chromium VI	ug/kg	NA		NA		NA	
EPA-9045							
pH	ph	7	A	7.8	A	7.6	VA

Notes: Units expressed as milligrams (mg) of chemical per kilogram (kg) of soil.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of +/- 10% (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O,R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- *: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

Table 8

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Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR06MW44A	IR06MW44A	IR06MW44A	IR10MW13A1
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9144X236	9202X370	9202X375	8914W13B
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	10/31/91	01/06/92	01/07/92	03/09/89
Lab Sample Number:	0612490002SA	0622000007SA	0622000012SA	3439-3

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	ND (10)	A	ND (10)	A	NA		3	VA/J
Acetone	ug/l	ND (10)	A	ND (10)	A	NA		ND (10)	VU1/BJ
1,2-Dichloroethene (total)	ug/l	ND (5)	A	ND (5)	A	NA		66	VA
Trichloroethene	ug/l	ND (5)	A	ND (5)	A	NA		31	VA
EPA-8010									
1,2-Dichloroethene (total)	ug/l	NA		NA		NA		NA	
Trichloroethene	ug/l	NA		NA		NA		NA	
EPA-8020									
1,3-Dichlorobenzene	ug/l	NA		NA		NA		NA	
Toluene	ug/l	NA		NA		NA		NA	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA/U
1,2-Dichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA/U
1,2,4-Trichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA/U
Bis(2-ethylhexyl)phthalate	ug/l	ND (2)	U1/Jb	NA		ND (10)	A	ND (14)	VU1/B

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

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Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A1	IR10MW13A1	IR10MW13A1	IR10MW13A1
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9034G306	9034G307	9128X100	9128X104
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	08/22/90	08/22/90	07/11/91	07/12/91
Lab Sample Number:	0544230005SA	0544230006SA	0592360012SA	0592360016SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	NA		NA		NA		NA	
Acetone	ug/l	NA		NA		ND(10) A		3.8 A/J	
1,2-Dichloroethene (total)	ug/l	NA		NA		NA		NA	
Trichloroethene	ug/l	NA		NA		NA		NA	
EPA-8010									
1,2-Dichloroethene (total)	ug/l	38 A		27 A		2.2 A		19 A	
Trichloroethene	ug/l	13 A		7.7 A		ND(0.5) A		9 A	
EPA-8020									
1,3-Dichlorobenzene	ug/l	ND(1) A		ND(1) A		ND(1) A		ND(1) A	
Toluene	ug/l	ND(0.5) A		ND(0.5) A		ND(0.5) A		3 A	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	ND(10) A		ND(10) A		ND(10) A		ND(10) A	
1,2-Dichlorobenzene	ug/l	ND(10) A		ND(10) A		ND(10) A		ND(10) A	
1,2,4-Trichlorobenzene	ug/l	ND(10) A		ND(10) A		ND(10) A		ND(10) A	
Bis(2-ethylhexyl)phthalate	ug/l	ND(10) A		ND(10) A		8.7 A/Jb		8.8 A/bJ	

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 8

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Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A1	IR10MW13A1	IR10MW13A2	IR10MW13A2
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9203X396	9203X397	8914W13A	8914W13ARE
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	01/13/92	01/13/92	03/09/89	03/09/89
Lab Sample Number:	0622450017SA	0622450018SA	3439-2	3439-2

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	ND (10)	A	ND (10)	A	ND (10)	A/U	NA	
Acetone	ug/l	ND (10)	A	ND (10)	A	ND (10)	U1/BJ	NA	
1,2-Dichloroethene (total)	ug/l	11	A	11	A	8	A	NA	
Trichloroethene	ug/l	8	A	9	A	ND (5)	A/U	NA	
EPA-8010									
1,2-Dichloroethene (total)	ug/l	NA		NA		NA		NA	
Trichloroethene	ug/l	NA		NA		NA		NA	
EPA-8020									
1,3-Dichlorobenzene	ug/l	NA		NA		NA		NA	
Toluene	ug/l	NA		NA		NA		NA	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	ND (10)	A	ND (10)	A	ND (10)	A/U	ND (10)	A/U
1,2-Dichlorobenzene	ug/l	ND (10)	A	ND (10)	A	ND (10)	A/U	ND (10)	A/U
1,2,4-Trichlorobenzene	ug/l	ND (10)	A	ND (10)	A	ND (10)	A/U	ND (10)	A/U
Bis (2-ethylhexyl)phthalate	ug/l	ND (10)	A	ND (10)	A	ND (43)	U1/B	ND (45)	U1/B

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 8

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Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A2	IR10MW13A2	IR10MW13A2	IR10MW14A
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9034G308	9128X099	9203X398	8914W14
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	08/22/90	07/11/91	01/13/92	03/09/89
Lab Sample Number:	0544230007SA	0592360011SA	0622450019SA	3439-4

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	NA		NA		ND (10) A		ND (10) A/U	
Acetone	ug/l	NA		ND (10) A		ND (10) A		ND (10) U1/BJ	
1,2-Dichloroethene (total)	ug/l	NA		NA		3 A/J		ND (5) A/U	
Trichloroethene	ug/l	NA		NA		ND (5) A		ND (5) A/U	
EPA-8010									
1,2-Dichloroethene (total)	ug/l	8.3 A		1.3 A		NA		NA	
Trichloroethene	ug/l	0.6 A		ND (0.5) A		NA		NA	
EPA-8020									
1,3-Dichlorobenzene	ug/l	ND (1) A		ND (1) A		NA		NA	
Toluene	ug/l	ND (0.5) A		ND (0.5) A		NA		NA	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	ND (10) A		ND (10) A		ND (10) A		3 A/J	
1,2-Dichlorobenzene	ug/l	ND (10) A		ND (10) A		ND (10) A		ND (10) A/U	
1,2,4-Trichlorobenzene	ug/l	ND (10) A		ND (10) A		ND (10) A		2 A/J	
Bis(2-ethylhexyl)phthalate	ug/l	ND (72) U1/#B		13 A/b		2 A/bJ		ND (10) U1/J	

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

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Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW14A	IR10MW14A	IR10MW14A	IR10MW14A
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9034G309	9128X107	9203X404	9203X405
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	08/22/90	07/12/91	01/14/92	01/14/92
Lab Sample Number:	0544230008SA	0592360019SA	0623170005SA	0623170006SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	NA		NA		ND (10) A		ND (10) A	
Acetone	ug/l	NA		ND (10) A		ND (10) A		ND (10) A	
1,2-Dichloroethene (total)	ug/l	NA		NA		ND (5) A		ND (5) A	
Trichloroethene	ug/l	NA		NA		ND (5) A		2 A/J	
EPA-8010									
1,2-Dichloroethene (total)	ug/l	ND (0.5) VA		4 A		NA		NA	
Trichloroethene	ug/l	0.65 VA		3.6 A		NA		NA	
EPA-8020									
1,3-Dichlorobenzene	ug/l	ND (1) VA		5.3 A		NA		NA	
Toluene	ug/l	ND (0.5) VA		4.7 A		NA		NA	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	4.1 VA/J		ND (10) A		ND (10) A		2 A/J	
1,2-Dichlorobenzene	ug/l	ND (10) VA		ND (10) A		2 A/J		ND (10) A	
1,2,4-Trichlorobenzene	ug/l	2.6 VA/J		ND (10) A		ND (10) A		ND (10) A	
Bis(2-ethylhexyl)phthalate	ug/l	ND (10) VA		2.1 A/Jb		ND (10) A		ND (10) A	

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 8

Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW29A1	IR10MW29A1	IR10MW29A1	IR10MW29A2
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9144X238	9203X403	9203X410	9144X239
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	10/31/91	01/14/92	01/15/92	10/31/91
Lab Sample Number:	0612490004SA	0623170004SA	0623170011SA	0612490005SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-VOC									
Vinyl chloride	ug/l	ND (10)	A	ND (10)	A	NA		ND (10)	VA
Acetone	ug/l	ND (10)	A	ND (10)	A	NA		ND (10)	VA
1,2-Dichloroethene (total)	ug/l	ND (5)	A	ND (5)	A	NA		ND (5)	VA
Trichloroethene	ug/l	ND (5)	A	ND (5)	A	NA		ND (5)	VA
EPA-8010									
1,2-Dichloroethene (total)	ug/l	NA		NA		NA		NA	
Trichloroethene	ug/l	NA		NA		NA		NA	
EPA-8020									
1,3-Dichlorobenzene	ug/l	NA		NA		NA		NA	
Toluene	ug/l	NA		NA		NA		NA	
CLP-SOC									
1,3-Dichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA
1,2-Dichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA
1,2,4-Trichlorobenzene	ug/l	ND (10)	A	NA		ND (10)	A	ND (10)	VA
Bis (2-ethylhexyl)phthalate	ug/l	ND (10)	A	NA		ND (10)	A	ND (3)	VU1/Jb

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Table 8
Analytical Results for Organic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

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Station Number:	IR10MW29A2	IR10MW29A2
Sample Depth(feet):	0.00	0.00
Sample Number:	9144X240	9203X402
Matrix:	H2O	H2O
Sample Date:	10/31/91	01/14/92
Lab Sample Number:	0612490006SA	0623170003SA

Test Method/Analyte Name	Units	value	qual	value	qual
CLP-VOC					
Vinyl chloride	ug/l	ND (10)	A	ND (10)	A
Acetone	ug/l	ND (10)	A	ND (10)	A
1,2-Dichloroethene (total)	ug/l	ND (5)	A	ND (5)	A
Trichloroethene	ug/l	ND (5)	A	ND (5)	A
EPA-8010					
1,2-Dichloroethene (total)	ug/l	NA		NA	
Trichloroethene	ug/l	NA		NA	
EPA-8020					
1,3-Dichlorobenzene	ug/l	NA		NA	
Toluene	ug/l	NA		NA	
CLP-SOC					
1,3-Dichlorobenzene	ug/l	ND (10)	A	ND (10)	A
1,2-Dichlorobenzene	ug/l	ND (10)	A	ND (10)	A
1,2,4-Trichlorobenzene	ug/l	ND (10)	A	ND (10)	A
Bis (2-ethylhexyl)phthalate	ug/l	ND (3)	U1/Jb	ND (10)	A

Notes: Units expressed as nanograms (ng), micrograms (ug), or milligrams (mg)
of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific reporting limit. Reporting limit is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- F: The presence of this compound is due to suspected field contamination.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J7: Analytical results for this compound are qualified as estimated due to linearity problems in the initial calibration.
- J8: Analytical results for this compound are qualified as estimated due to detection of the compound above the instrument calibration range.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Compound is also detected in the laboratory method blank.
- #,b: Analytical results should not be considered reliable for this common lab contaminant.
- D: Compound is identified in an analysis at a secondary dilution factor.
- E: Concentration exceeds the calibration range of the GC/MS instrument for the specific analysis.
- G: Reporting limit raised due to matrix interference.
- J: Result is detected below the reporting limit or is an estimated concentration.
- j: All reporting limits for this sample raised due to matrix interferences.
- l: If 'l' is attached to a diesel result, then either the hydrocarbons present in this sample represent an unknown mixture at a concentration of less than 45 mg/kg, or the hydrocarbons present in this sample do not fit the diesel pattern, but are found in the diesel range. (Quantification was based upon diesel references.) If 'l' is attached to a gasoline result, then this sample contains late eluting hydrocarbons. Early gasoline peaks are below reporting limits.
- o: Reporting limit raised due to high level of analyte present in sample.

Laboratory Assigned Qualifiers (Continued...)

r: Reporting limit changed due to sample volume limitations.

U: Compound was analyzed but not detected.

X,Y: Specific flag used to properly define the results. Qualifier is fully described in the Sample Data Summary Package and the Case Narrative.

Table 9

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Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR06MW44A	IR06MW44A	IR10MW13A1	IR10MW13A1
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9144X236	9202X375	8914W13B	9034G306
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	10/31/91	01/07/92	03/09/89	08/22/90
Lab Sample Number:	0612490002SA	0622000012SA	3439-3	0544230005SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-FUAA									
Arsenic	ug/l	ND (1.4)	A/W	ND (1.4)	A	ND (1.2)	VA/UN	ND (2)	A
Lead	ug/l	ND (2)	A/W	ND (2)	A	ND (7)	VJ3/UNW	ND (2.2)	A/NW
Selenium	ug/l	ND (2.5)	A/W	ND (2.5)	J3/N	ND (19)	VA/UN	ND (3.9)	A/NW
CLP-ICP									
Aluminum	ug/l	ND (53)	U1/B	ND (15.3)	A	ND (16.5)	VA/U	43.1	A
Antimony	ug/l	ND (27.6)	A	40.1	A/B	NA		ND (18)	A
Barium	ug/l	23.2	A/B	13.9	A/B	306	VA	245	A
Beryllium	ug/l	ND (0.35)	A	ND (0.35)	A	ND (2)	VA/U	ND (1.2)	A
Cadmium	ug/l	ND (2.3)	A	6.4	A	ND (4)	VA/U	ND (2.9)	A
Calcium	ug/l	217000	A/E	175000	A/E	79700	VA	66600	A
Cobalt	ug/l	16.7	A/B	14.4	A/B	ND (9)	VA/U	ND (8.6)	A
Copper	ug/l	1.9	A/B	ND (1.6)	A	ND (2.5)	VA/UN	ND (12.7)	U1
Iron	ug/l	794	A	504	A	ND (101)	VU1/E	21.8	A
Magnesium	ug/l	915000	A	748000	A	293000	VA	305000	A
Manganese	ug/l	4930	A	5050	A	138	VJ9	137	A/W
Nickel	ug/l	117	A	89.4	A	14.1	VA/B	ND (21.6)	A
Potassium	ug/l	16800	A	11800	A	5950	VJ4/E	5720	A
Silver	ug/l	ND (4.9)	A	ND (4.9)	A	16.2	VA	ND (1.6)	A
Sodium	ug/l	793000	A	714000	A	574000	VA	602000	A
Vanadium	ug/l	ND (3.9)	A	ND (3.9)	A	64.4	VJ9	ND (1.9)	A
Zinc	ug/l	ND (6.1)	A	49.8	A	ND (9)	VJ9/UN	ND (9)	U1
Molybdenum	ug/l	ND (3.1)	A	ND (3.1)	A	ND (15)	VA/U	NA	
EPA-300.0									
Sulfate	mg/l	4340	A/R	2620	A/R	230.84	VA	238	A/R
Nitrate as N	mg/l	ND (0.5)	J5/G	2.4	A/G	0.1	VA	ND (0.5)	J5/G
Chloride	mg/l	2500	A/R	1510	A/R	1312.33	VA	1630	A/R
EPA-9045									
pH	ph	NA		NA		8.2	VJ7	NA	
EPA-160.1									
Total Dissolved Solids	mg/l	9330	A/R	6290	A/R	NA		3160	A

Notes:

Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9

Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A1	IR10MW13A1	IR10MW13A1	IR10MW13A1
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9034G307	9128X100	9128X104	9203X396
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	08/22/90	07/11/91	07/12/91	01/13/92
Lab Sample Number:	0544230006SA	0592360012SA	0592360016SA	0622450017SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-FUAA									
Arsenic	ug/l	ND (2)	A	ND (1.6)	A	ND (1.6)	A	1.7	A
Lead	ug/l	ND (2.2)	A/NW	ND (1.6)	A	ND (1.6)	A	ND (2)	A
Selenium	ug/l	ND (3.9)	A/NW	6.6	A/M	ND (3.4)	A/W	ND (2.5)	A
CLP-ICP									
Aluminum	ug/l	328	A	ND (20.7)	A	ND (20.7)	A	ND (15.3)	A
Antimony	ug/l	ND (18)	A	ND (16.7)	A	ND (16.7)	A	31.7	A
Barium	ug/l	241	A	88.1	A	233	A	225	A
Beryllium	ug/l	ND (1.2)	A	0.54	A	0.27	A	ND (0.35)	A
Cadmium	ug/l	ND (2.9)	A	ND (1.6)	A	ND (1.6)	A	ND (2.3)	A
Calcium	ug/l	66000	A	129000	A	66300	A	64800	A
Cobalt	ug/l	ND (8.6)	A	ND (6.3)	A	ND (6.3)	A	ND (10.4)	A
Copper	ug/l	72.7	A	ND (2.5)	A	ND (2.5)	A	ND (1.6)	A
Iron	ug/l	31.2	A	ND (9.4)	A	ND (9.4)	A	ND (6.3)	A
Magnesium	ug/l	304000	A	294000	A	296000	A	286000	A
Manganese	ug/l	136	A/N	44.7	A	109	A	108	A
Nickel	ug/l	ND (21.6)	A	ND (14.1)	A	ND (14.1)	A	ND (17.8)	A
Potassium	ug/l	5370	A	15000	A	5330	A	5770	A
Silver	ug/l	ND (1.6)	A	ND (1.1)	A	ND (1.1)	A	ND (4.9)	A
Sodium	ug/l	599000	A	847000	A	545000	A	563000	A
Vanadium	ug/l	ND (1.9)	A	4.9	A	4.3	A	ND (3.9)	A
Zinc	ug/l	ND (7.1)	U1	2.6	A	ND (1.3)	A	ND (6.1)	A
Molybdenum	ug/l	NA		5.2	A	ND (2.7)	A	ND (3.1)	A
EPA-300.0									
Sulfate	mg/l	238	A/R	292	A/R	251	A/R	242	A/R
Nitrate as N	mg/l	ND (0.5)	J5/G	ND (0.5)	A/G	ND (0.5)	A/G	ND (0.5)	A/G
Chloride	mg/l	1630	A/R	1710	A/R	1390	A/R	1290	A/R
EPA-9045									
pH	ph	NA		7.7	A	7.8	A	NA	
EPA-160.1									
Total Dissolved Solids	mg/l	3040	A	3600	A/R	3160	A	2880	A/R

Notes: Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9

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Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A1	IR10MW13A2	IR10MW13A2	IR10MW13A2
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9203X397	8914W13A	9034G308	9128X099
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	01/13/92	03/09/89	08/22/90	07/11/91
Lab Sample Number:	0622450018SA	3439-2	0544230007SA	0592360011SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-FUAA									
Arsenic	ug/l	ND (1.4)	A	ND (1.2)	A/UNW	ND (2)	A	1.8	A/W
Lead	ug/l	ND (2)	A	ND (7)	A/UNW	ND (2.2)	A/NW	ND (1.6)	A
Selenium	ug/l	ND (2.5)	A/W	ND (1.9)	A/UNW	ND (3.9)	A/N	7.3	A/+
CLP-ICP									
Aluminum	ug/l	ND (15.3)	A	17.7	A/B	ND (34.5)	A	ND (20.7)	A
Antimony	ug/l	ND (27.6)	A	NA		ND (18)	A	ND (16.7)	A
Barium	ug/l	227	A	151	A/B	98.7	A	88.1	A
Beryllium	ug/l	ND (0.35)	A	ND (2)	A/U	ND (1.2)	A	0.54	A
Cadmium	ug/l	ND (2.3)	A	ND (4)	A/U	ND (2.9)	A	ND (1.6)	A
Calcium	ug/l	64900	A	162000	A	128000	A	130000	A
Cobalt	ug/l	ND (10.4)	A	ND (9)	A/U	ND (8.6)	A	ND (6.3)	A
Copper	ug/l	ND (1.6)	A	ND (2.5)	A/UN	19.7	A	ND (2.5)	A
Iron	ug/l	ND (6.3)	A	ND (108)	U1/E	ND (19.8)	A	ND (9.4)	A
Magnesium	ug/l	283000	A	256000	A	276000	A	295000	A
Manganese	ug/l	105	A	1580	A	1790	A/N	22.1	A
Nickel	ug/l	ND (17.8)	A	ND (10.6)	A/U	ND (21.6)	A	ND (14.1)	A
Potassium	ug/l	5270	A	17100	A/E	13700	A	15100	A
Silver	ug/l	ND (4.9)	A	20.7	A	ND (1.6)	A	ND (1.1)	A
Sodium	ug/l	560000	A	890000	A	883000	A	849000	A
Vanadium	ug/l	ND (3.9)	A	70.6	A	ND (1.9)	A	5.3	A
Zinc	ug/l	ND (6.1)	A	ND (13.2)	U1/BN	12.1	A	ND (1.3)	A
Molybdenum	ug/l	ND (3.1)	A	ND (15)	A/U	NA		5.9	A
EPA-300.0									
Sulfate	mg/l	245	A/R	342.43	A	332	A/R	282	A/R
Nitrate as N	mg/l	ND (0.5)	A/G	0.13	A	ND (0.5)	J5/G	ND (0.5)	A/G
Chloride	mg/l	1280	A/R	1682.32	A	2100	A/R	1820	A/R
EPA-9045									
pH	ph	NA		8.2	A	NA		7.7	A
EPA-160.1									
Total Dissolved Solids	mg/l	2760	A/R	NA		4030	A	3660	A/R

Notes: Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9

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Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW13A2	IR10MW14A	IR10MW14A	IR10MW14A
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9203X398	8914W14	9034G309	9128X107
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	01/13/92	03/09/89	08/22/90	07/12/91
Lab Sample Number:	0622450019SA	3439-4	0544230008SA	0592360019SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-FUAA									
Arsenic	ug/l	ND (1.4)	A	ND (1.2)	A/UNW	ND (2)	VA	ND (1.6)	A/W
Lead	ug/l	ND (2)	A/W	ND (1.4)	A/UNW	ND (2.2)	VA/N	ND (1.6)	A
Selenium	ug/l	ND (2.5)	A/W	ND (19)	A/UNW	ND (3.9)	VJ3/NW	ND (3.4)	A/W
CLP-ICP									
Aluminum	ug/l	ND (15.3)	A	24.1	A/B	ND (34.5)	VA	ND (20.7)	A
Antimony	ug/l	46.6	A/B	NA		ND (18)	VA	ND (16.7)	A
Barium	ug/l	87.4	A/B	94.6	A/B	40.8	VA	42.2	A
Beryllium	ug/l	ND (0.35)	A	ND (2)	A/U	ND (1.2)	VA	0.27	A
Cadmium	ug/l	ND (2.3)	A	ND (4)	A/U	ND (2.9)	VA	ND (1.6)	A
Calcium	ug/l	94300	A	73100	A	66500	VA	69700	A
Cobalt	ug/l	ND (10.4)	A	ND (9)	A/U	ND (8.6)	VA	ND (6.3)	A
Copper	ug/l	ND (1.6)	A	ND (2.5)	A/UN	22.5	VA	ND (2.5)	A
Iron	ug/l	ND (7.5)	U1/B	ND (118)	U1/E	ND (19.8)	VA	ND (9.4)	A
Magnesium	ug/l	251000	A	204000	A	222000	VA	244000	A
Manganese	ug/l	1340	A	189	A	199	VA/N	197	A
Nickel	ug/l	ND (17.8)	A	19.8	A/B	ND (21.6)	VA	28.4	A
Potassium	ug/l	12100	A	3520	A/BE	3260	VA	3480	A
Silver	ug/l	ND (4.9)	A	12.6	A	ND (1.6)	VA	ND (1.1)	A
Sodium	ug/l	813000	A	190000	A	264000	VA	255000	A
Vanadium	ug/l	ND (3.9)	A	48.8	A/B	ND (1.9)	VA	3.8	A
Zinc	ug/l	ND (6.1)	A	ND (9)	A/UN	ND (3.2)	VU1	8.2	A
Molybdenum	ug/l	ND (5.2)	U1/B	ND (15)	A/U	NA		17.1	A
EPA-300.0									
Sulfate	mg/l	300	A/R	662.25	A	675	VA/R	635	A/R
Nitrate as N	mg/l	ND (0.5)	A/G	0.23	A	ND (0.5)	VJ5/G	ND (0.5)	A/G
Chloride	mg/l	1600	A/R	280.56	A	599	VA/R	568	A/R
EPA-9045									
pH	ph	NA		8.2	A	NA		7.7	A
EPA-160.1									
Total Dissolved Solids	mg/l	3600	A/R	NA		2020	VA	1980	A

Notes: Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9

Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW14A	IR10MW14A	IR10MW29A1	IR10MW29A1
Sample Depth(feet):	0.00	0.00	0.00	0.00
Sample Number:	9203X404	9203X405	9144X238	9203X410
Matrix:	H2O	H2O	H2O	H2O
Sample Date:	01/14/92	01/14/92	10/31/91	01/15/92
Lab Sample Number:	0623170005SA	0623170006SA	0612490004SA	0623170011SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual	value	qual
CLP-FUAA									
Arsenic	ug/l	2.8	A/B	2.7	A/WB	6.9	A/B	9.9	A/B
Lead	ug/l	ND(2)	A	ND(2)	A	ND(2)	A	ND(2)	A
Selenium	ug/l	ND(2.5)	A	ND(2.5)	A/W	ND(2.5)	A/W	ND(2.5)	A
CLP-ICP									
Aluminum	ug/l	ND(20)	A	ND(20)	A	ND(28.3)	U1/B	ND(20)	A
Antimony	ug/l	ND(26.3)	A	ND(26.3)	A	ND(27.6)	A	ND(26.3)	A
Barium	ug/l	32.1	A/B	30.5	A/B	12.2	A/B	10.7	A/B
Beryllium	ug/l	ND(0.9)	A	ND(0.9)	A	ND(0.35)	A	ND(0.9)	A
Cadmium	ug/l	ND(2.8)	A	ND(2.8)	A	ND(2.3)	A	ND(2.8)	A
Calcium	ug/l	54600	A	49900	A	63700	A/E	63600	A
Cobalt	ug/l	ND(7.9)	A	15.2	A/B	ND(10.4)	A	ND(7.9)	A
Copper	ug/l	1.9	A/B	3.9	A/B	ND(1.6)	A	3.8	A/B
Iron	ug/l	12	A/B	10.8	A/B	ND(18.6)	U1/B	10.8	A/B
Magnesium	ug/l	183000	A	157000	A	113000	A	120000	A
Manganese	ug/l	133	A	147	A	57.1	A	20.1	A
Nickel	ug/l	ND(28.8)	A	31.9	A/B	ND(17.8)	A	ND(28.8)	A
Potassium	ug/l	3580	A/B	3390	A/B	2770	A/B	3200	A/B
Silver	ug/l	ND(1.7)	A	ND(1.7)	A	ND(4.9)	A	ND(1.7)	A
Sodium	ug/l	210000	A	200000	A	78000	A	83200	A
Vanadium	ug/l	1.5	A/B	ND(1.4)	A	7	A/B	5.9	A/B
Zinc	ug/l	ND(1.9)	A	ND(1.9)	A	ND(6.1)	A	ND(1.9)	A
Molybdenum	ug/l	18.1	A/B	13.6	A/B	63	A	62.2	A
EPA-300.0									
Sulfate	mg/l	467	A/R	471	A/R	335	A/R	291	A/R
Nitrate as N	mg/l	0.085	A	0.099	A	ND(0.05)	J5	0.33	A
Chloride	mg/l	330	A/R	322	A/R	163	A/R	165	A/R
EPA-9045									
pH	ph	NA		NA		NA		NA	
EPA-160.1									
Total Dissolved Solids	mg/l	1490	A	1480	A	1020	A	933	A

Notes:

Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Table 9

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Analytical Results for Inorganic Compounds Detected in Groundwater Samples
Monitoring Wells From Sites IR-10 and IR-6 Within Site PA-24
Hunters Point Annex

Station Number:	IR10MW29A2	IR10MW29A2	IR10MW29A2
Sample Depth(feet):	0.00	0.00	0.00
Sample Number:	9144X239	9144X240	9203X402
Matrix:	H2O	H2O	H2O
Sample Date:	10/31/91	10/31/91	01/14/92
Lab Sample Number:	0612490005SA	0612490006SA	0623170003SA

Test Method/Analyte Name	Units	value	qual	value	qual	value	qual
CLP-FUAA							
Arsenic	ug/l	4.1	VA/B	4.4	A/B	4	A/B
Lead	ug/l	2.1	VA	ND(2)	A	3	A
Selenium	ug/l	2.6	VA/B	ND(2.5)	A	ND(2.5)	A/W
CLP-ICP							
Aluminum	ug/l	ND(35.6)	VU1/B	ND(76.5)	A	ND(20)	A
Antimony	ug/l	ND(27.6)	VA	ND(138)	A	ND(26.3)	A
Barium	ug/l	119	VA/B	132	A/B	121	A/B
Beryllium	ug/l	ND(0.35)	VA	ND(1.8)	A	1.4	A/B
Cadmium	ug/l	3.4	VA/B	ND(11.6)	A	ND(2.8)	A
Calcium	ug/l	41500	VJ4/E	48200	A/E	46000	A
Cobalt	ug/l	10.6	VA	ND(52)	A	ND(12.3)	U2/B
Copper	ug/l	2.2	VA	ND(7.8)	A	5.8	A/B
Iron	ug/l	ND(6.3)	VA	68	A/B	31.4	A/B
Magnesium	ug/l	207000	VA	224000	A	221000	A
Manganese	ug/l	468	VA	510	A	488	A
Nickel	ug/l	51.6	VA	ND(89)	A	ND(28.8)	A
Potassium	ug/l	107000	VA	113000	A	113000	A
Silver	ug/l	ND(4.9)	VA	ND(24.6)	A	ND(1.7)	A
Sodium	ug/l	2060000	VA	2140000	A	2120000	A
Vanadium	ug/l	14	VA/B	ND(19.5)	A	6.3	A/B
Zinc	ug/l	ND(6.1)	VA	ND(30.5)	A	ND(1.9)	A
Molybdenum	ug/l	7.6	VA/B	ND(15.4)	A	ND(4.4)	A
EPA-300.0							
Sulfate	mg/l	21.9	VA/G	21.9	A/G	23.2	A/G
Nitrate as N	mg/l	ND(0.5)	VJ5/G	ND(0.5)	J5/G	ND(0.5)	A/G
Chloride	mg/l	3510	VA/R	3620	A/R	3780	A/R
EPA-9045							
pH	ph	NA		NA		NA	
EPA-160.1							
Total Dissolved Solids	mg/l	6730	VA/R	6840	A/R	6520	A/R

Notes: Units expressed as nanograms (ng), micrograms (ug), milligrams (mg),
picoCuries (pCi) or million structures (ms) of chemical per liter (l) of water.

NA: Not Analyzed.

ND(): Not Detected at a specific detection limit. Limit of detection is included in parenthesis.

Validation Assigned Qualifiers

- A: Data is acceptable based on a review of laboratory and field QC samples and holding times as discussed in the text.
- J2: Analytical results for this compound are qualified as estimated due to laboratory matrix duplicate quality control criteria exceedances.
- J3: Analytical results for this compound are qualified as estimated due to poor spike recoveries.
- J4: Analytical results for this compound are qualified as estimated due to ICP-serial dilution relative percent difference quality control criteria exceedances.
- J5: Analytical results for this compound are qualified as estimated due to holding time exceedances.
- J6: Analytical results for this compound are qualified as estimated due to field duplicate quality control criteria exceedances.
- R1: Analytical results for this compound are qualified as rejected due to holding time exceedances.
- R2: Analytical results for this compound are qualified as rejected due to poor spike recoveries.
- U1: Compound is qualified as non-detected due to its occurrence in the laboratory blanks.
- U2: Compound is qualified as non-detected due to its occurrence in the field blanks.
- V: Sample has undergone full CLP validation.

Laboratory Assigned Qualifiers

- B: Reported value is less than the CRDL and greater than or equal to the instrument detection limit.
- E: The serial dilution analysis did not meet the contractual requirement of +/- 10% (SOW 7/87 E-12)
- G: Reporting limit raised due to matrix interference.
- N: Spiked sample recovery not within control limits.
- O,R: Reporting limit raised due to high level of analyte present in sample.
- S: The reported value was determined by the Method of Standard Additions (MSA).
- U: Compound was analyzed but not detected.
- W: Post-digestion spike for furnace AA analysis is outside of control limits.
- *: Duplicate analysis not within control limits.
- +: Correlation coefficient for the MSA is less than 0.995.

**Table 10. Rationale for Proposed Sampling Locations
Site PA-24**

Location*	Area	Rationale
<u>Test Borings:</u>		
1	Adjacent to grease trap on northwest side of Building 125	Assess soil chemistry adjacent to grease trap
2, 3, 7, and 8	In asphalted parking lot northeast and southwest of Buildings 128 and 130	Assess soil chemistry in areas of poor housekeeping practices
4, 5, and 6	Areas northeast of Building 128, between Buildings 128 and 130, and north of Building 130	Assess soil chemistry in areas of observed staining and adjacent to transformers in Buildings 128 and 130
<u>Monitorings Wells:</u>		
1	Area north of Building 125 adjacent to transformers	Assess soil and monitor groundwater adjacent to building and transformers
2	Area northeast of transformers in Building 128	Assess soil and monitor groundwater adjacent to building and transformers
3	Area near east corner of Building 130	Assess soil and monitor groundwater on east side of site Assess groundwater flow direction and gradient
<u>Borings in Sumps:</u>		
1	Sump northwest side of Building 130	Assess potential for releases beneath sump
2	Sump southeast side of Building 130	Assess potential for releases beneath sump

Note: * Proposed locations shown on Plate 3.

Table 11. Summary of Analytical Results for Site PA-32

Boring Number	BE2-1	BE3-6	BF2-2
Sample Matrix:	soil	soil	soil
<u>SEMIVOLATILE ORGANIC COMPOUNDS (ppb)</u>			
Bis(2-ethylhexyl)phthalate	NA	1800	ND
Fluoranthene	NA	ND	80
Phenanthrene	NA	ND	80
Pyrene	NA	ND	76
Octadecane	NA	150	ND
2,6,10,14-Tetra- methylheptadecane	NA	180	ND
Heptacosane	NA	250	ND
Heneicosane	NA	150	ND
Pentacosane	NA	180	ND
<u>METALS (ppm)</u>			
Chromium	NA	89	78
Copper	NA	54	44
Lead	NA	19	12
Nickel	NA	76	73
Zinc	NA	49	38
<u>ASBESTOS</u>			
% Natural Chrysotile	ND	ND	ND

Notes: All concentrations are reported in parts per billion (ppb) or parts per million (ppm), as noted.
 ND = Not detected
 NA = Not analyzed
 Boring locations shown on Plate 4.

Source: *EMCON, 1987*

**Table 12. Rationale for Proposed Sampling Locations
Site PA-32**

Location*	Area	Rationale
<u>Test Borings:</u>		
1	Adjacent to EMCON Boring BE3-6 on northwest side of site	Confirm SOC's detected in EMCON boring
2	Adjacent to a sump west of Building 383	Assess soil chemistry adjacent to sump
3 and 5	In asphalt parking lot near Building 383	Assess soil chemistry in unknown areas adjacent to the Building 383
<u>Monitoring Well:</u>		
4	Southeast side of Building 383	Confirm SOC's detected in soil by EMCON Monitor groundwater

Note: * Proposed boring locations shown on Plate 4.

**Table 13. Analytical Results from Previous Investigation
Building 400 - Site PA-36**

Boring Number Sample Matrix:	B-1 soil	B-2 soil	B-3 soil	B-4 soil	B-5 soil
<u>METALS</u>					
Antimony	9.0	14	15	12	15
Arsenic	4.2	16	3.3	11	13
Beryllium	0.10	0.20	0.40	0.30	0.20
Cadmium	0.70	1.3	1.0	0.90	0.90
Chromium	150	300	380	250	290
Copper	19	41	15	43	33
Lead	3.9	4.9	6.3	4.2	4.2
Mercury	0.018	0.055	0.023	0.063	0.013
Nickel	340	510	1,800	460	590
Selenium	0.77	3.5	0.15	1.7	2.7
Silver	0.60	1.5	1.0	1.2	1.2
Thallium	9.0	16	15	10	13
Zinc	44	100	39	54	59
<u>TOTAL PETROLEUM HYDROCARBONS (TPH)</u>					
TPH as Gasoline	<1.0	<1.0	<1.0	<1.0	9.0
<u>ASBESTOS</u>					
Fibers/gram	<100	<100	<100	<100	<100

Notes: All metals and TPH concentrations reported in parts per million (ppm).
Soil samples collected from the first 5 feet below the ground surface.
Boring locations shown on Plate 5.

Source: PSC, 1987.

Table 14. Summary of Analytical Results for Site PA-36

Boring Number	AD4-14	AD4-19	AD4-21	AD4-22	AE4-2	AE4-4	AE4-5	AE4-7	AE4-8	BE3-1
Sample Matrix:	soil	soil	soil	soil	soil	soil	soil	soil	soil	soil
<u>VOLATILE ORGANIC COMPOUNDS (ppb)</u>										
Toluene	NA	4	NA	ND	NA	NA	NA	NA	NA	NA
Acetone	NA	22	NA	ND	NA	NA	NA	NA	NA	NA
<u>SEMIVOLATILE ORGANIC COMPOUNDS (ppb)</u>										
Fluoranthene	ND	ND	120	ND	ND	ND	ND	ND	ND	NA
Pyrene	ND	ND	100	ND	ND	ND	ND	ND	ND	NA
Bis(2-ethylhexyl)phthalate	1,000	330	ND	1,000	ND	6,300	4,700	1,500	ND	NA
Benzo(b)anthracene	ND	ND	ND	ND	ND	ND	ND	120	ND	NA
Hexadecane	ND	ND	ND	270	ND	80	ND	ND	ND	NA
2,6,10,14-Tetra-methylheptadecane	ND	ND	ND	450	ND	180	ND	ND	270	NA
Nonadecane	ND	ND	ND	190	ND	ND	ND	ND	ND	NA
Heneicosane	ND	ND	ND	270	ND	ND	450	39	130	NA
Tetracosane	ND	180	ND	ND	ND	ND	700	1,600	ND	NA
Hexacosane	ND	230	ND	ND	ND	130	840	2,700	ND	NA
Octacosane	ND	210	ND	ND	ND	110	790	2,300	ND	NA
Octadecane	ND	ND	ND	230	ND	ND	ND	ND	ND	NA
Eicosane	ND	ND	ND	160	ND	ND	ND	ND	ND	NA
Docosane	ND	ND	ND	90	ND	ND	590	970	ND	NA
Pentacosane	ND	230	ND	ND	ND	130	750	2,300	ND	NA
Heptacosane	ND	190	ND	ND	ND	110	770	2,500	ND	NA
Nonacosane	ND	200	ND	ND	ND	ND	ND	1,600	ND	NA
Heptadecane	ND	ND	ND	200	ND	ND	ND	ND	140	NA
<u>METALS (ppm)</u>										
Chromium	160	110	150	150	300	120	130	170	440	NA
Copper	53	39	30	48	7	33	90	200	26	NA
Lead	42	16	18	17	14	15	45	84	19	NA
Nickel	300	260	560	280	1,300	320	200	450	1,200	NA
Zinc	110	46	39	53	15	38	160	140	30	NA
<u>ASBESTOS</u>										
% Natural Chrysotile	trace	1 - 5	ND	1 - 5	1 - 5	trace	1 - 5	1 - 5	1 - 10	trace

Notes: All concentrations are reported in parts per billion (ppb) or parts per million (ppm), as noted.

ND = Not detected

NA = Not analyzed

Boring locations shown on Plate 5.

Source: EMCON, 1987

**Table 15. Rationale for Proposed Sampling Locations
Site PA-36**

Location*	Area	Rationale
<u>Test Borings:</u>		
2,3,4,6,7,10,11 12,13,14,15,19 21,22, 23 and 26	In areas of reported and observed releases and staining, and adjacent to transformers and vaults	Confirm SOCs detected by EMCON in soil Assess areas of reported releases Sample adjacent to transformers and vaults
1,5,8,9,16,17 18,20,24,25,27 28,29,30	Areas adjacent to buildings and in open lots throughout the site	Assess soil chemistry in areas adjacent to buildings and vacant lots where poor housekeeping practices are evident but no staining is visible
<u>Monitoring Wells:</u>		
1 and 3	Areas adjacent to building and in an open lot	Assess soil chemistry and monitor groundwater in areas where poor housekeeping practices are evident but no staining is visible
2,4,5,6,7	In areas of reported and observed releases and staining, and also adjacent to EMCON borings to confirm SOCs in soil	Assess soil chemistry and monitor groundwater in areas of reported releases and where staining is evident

Notes: * Proposed boring locations shown on Plate 5.

Table 16. Summary of Analytical Results for Site PA-39

Boring Number	AD4-15	AD4-16	AE3-2	AE3-5	AE3-6	AE4-1	AE4-9
Sample Matrix:	soil	soil	soil	soil	soil	soil	soil
<u>VOLATILE ORGANIC COMPOUNDS (ppb)</u>							
Toluene	NA	NA	NA	3	NA	NA	3
1,1,3-trimethyl-cyclohexane	NA	NA	NA	ND	NA	NA	7
Unknown *	NA	NA	NA	ND	NA	NA	5
Unknown *	NA	NA	NA	ND	NA	NA	6
<u>SEMIVOLATILE ORGANIC COMPOUNDS (ppb)</u>							
Di-n-butylphthalate	ND	400	170	ND	260	ND	ND
Fluoranthene	ND	ND	ND	ND	190	ND	ND
Pyrene	ND	ND	ND	ND	180	ND	ND
Chrysene	ND	ND	ND	ND	81	ND	ND
Benzo(b)fluoranthene	ND	ND	ND	ND	120	ND	ND
Bis(2-ethylhexyl)phthalate	2,800	1,700	530	600	230	730	1,600
2,6,10,14-Tetra-methylheptadecane	ND	ND	ND	ND	ND	ND	590
Heneicosane	ND	ND	230	ND	ND	ND	1,800
Tetracosane	ND	ND	350	ND	ND	ND	7,200
Hexacosane	ND	ND	480	ND	ND	ND	9,000
Octacosane	ND	ND	ND	ND	ND	ND	6,700
Eicosane	ND	ND	ND	ND	ND	ND	710
Docosane	ND	ND	190	ND	ND	ND	5,300
Heptacosane	ND	ND	350	ND	ND	ND	8,500
Pentacosane	ND	ND	350	ND	ND	ND	9,000
Nonacosane	ND	ND	ND	ND	ND	ND	6,100
<u>METALS (ppm)</u>							
Chromium	300	200	27	NA	NA	89	87
Copper	31	24	33	NA	NA	31	34
Lead	18	15	6.6	NA	NA	10	6
Nickel	530	590	25	NA	NA	220	200
Zinc	47	36	38	NA	NA	36	41
<u>ASBESTOS</u>							
% Natural Chrysotile	ND	ND	ND	1 - 5	1 - 10	ND	1 - 10

Notes: All concentrations are reported in parts per billion (ppb) or parts per million (ppm), as noted.

* = Unknown compound not identified by the laboratory

ND = Not detected

Boring locations shown on Plate 6.

Source: EMCON, 1987

**Table 17. Rationale for Proposed Sampling Locations
Site PA-39**

Location*	Area	Rationale
<u>Test Borings:</u>		
1,2,3,4,7	Adjacent to EMCON borings	Confirm SOCs and VOCs detected by EMCON in the soil
5	Southwest side of Building 505	Assess soil chemistry adjacent to back door of cafeteria
6	Northwest corner of Building 707	Assess soil chemistry in area where drums are currently stored
<u>Monitoring Wells:</u>		
1 and 3	Adjacent to EMCON borings	Confirm SOCs and VOCs detected by EMCON in the soil Assess groundwater chemistry these areas
2	Southwest side of Building 505	Assess soil chemistry in areas adjacent to this building

Note: * Proposed boring locations shown on Plate 6.

Table 18. Proposed Analytical Program by PA Site

Proposed Analysis	PA-19		PA-24		PA-32		PA-36		PA-39		Number of Analyses (Soil)	Number of Analyses (Groundwater)
	Soil (1)	Groundwater (2) (If encountered)	Soil	Groundwater	Soil	Groundwater	Soil	Groundwater	Soil	Groundwater		
CLP VOCs	--	--	63	3	26	1	192	7	53	3	334	14
CLP SOCs	35	1	63	3	26	1	192	7	53	3	369	15
CLP PCBs/Pesticides	35	1	63	3	26	1	192	7	53	3	369	15
Metals (3)	35	1	63	3	26	1	192	7	53	3	369	15
Hexavalent Chromium EPA Method 7196, SW-846	--	--	63	3	26	1	192	7	53	3	334	14
CLP Cyanide	--	--	63	3	26	1	192	7	53	3	334	14
TPH Gasoline (4) EPA Method 5030, SW-846	35	1	63	3	26	1	192	7	53	3	369	15
TPH Diesel (4) EPA Method 5030, SW-846	35	1	63	3	26	1	192	7	53	3	369	15
Total Oil and Grease EPA Test Method 413.2	35	1	63	3	26	1	192	7	53	3	369	15
Asbestos (5)	21	0	36	0	15	0	111	0	30	0	213	0
pH (soil) EPA 9045	35	0	63	0	26	0	192	0	53	0	369	0
Radiation (6)	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	--	--

Notes:

-- Analysis not proposed

NE Not expected

- (1) Soil samples will be collected between 0.5 and 1.0 foot below ground surface (bgs) and at 2.5 foot intervals above the water table, estimated to be approximately 10 feet bgs; average of 5 soil samples per boring. These samples and one additional soil sample from immediately below the water table from borings completed as monitoring wells will be analyzed.
- (2) One round of groundwater monitoring will be performed.
- (3) Metals analyses include Priority Pollutant Metals plus barium, cobalt, molybdenum, and vanadium. Metals excluded from the CLP Metals list are aluminum, calcium, iron, magnesium, manganese, potassium, and sodium.
- (4) Leaking Underground Fuel Tank (LUFT) Field Manual, April 1989, Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure, State of California, Leaking Underground Fuel Tank.
- (5) Asbestos analyses will be performed using polarizing light microscopy according to procedures described in 40 CFR 763, Appendix A to Subpart F, "Interim Method for the Determination of Asbestos in Bulk Insulation Samples." Soil samples from the upper five feet of the soil column will be analyzed for asbestos.
- (6) Laboratory analytical method for determining gross alpha and beta radiation is EPA Test Method 9310. Laboratory proprietary method for determining specific radionuclides from gamma spectroscopy. Specific radionuclides analyzed for soil are K40, Cs137, Ra226, Ra228, Th228, and Am241. Specific radionuclides for groundwater are Ra226, Ra228, K40, Cs137, and Ac228.

**Table 19. Sample Containers, Handling and Preservation Protocols
for Groundwater and Soil Samples**

Sample Matrix	Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Water	CLP VOCs	40 mL or 125 mL glass vial, Teflon-back septum	Two (2) or Three (3); vials filled completely, no air space	Cool to 4°C (ice in cooler) HCl to pH <2	10 days ¹
Water	CLP SOCs, CLP PCBs/Pesticides	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C (ice in cooler)	Extract within 5 days; analyze within 40 days ¹
Water	Priority Pollutant Metals, plus barium, cobalt, molybdenum and vanadium (CLP Methods)	1 liter polyethylene bottle	One (1); bottle is filled	Nitric Acid to below pH of 2 (approximately 2 mL concentrated HNO ₃ per liter after field filtering with 0.45 micron filter); cool to 4°C (ice in cooler)	6 months (26 days for mercury) ¹
Water	Hexavalent Chromium	250 mL polyethylene bottle	One (1); bottle is filled	Cool to 4°C (ice in cooler)	24 hours
Water	CLP Cyanide	1 liter polyethylene bottle	One (1); bottle is filled	NaOH to pH>12; Cool to 4°C (ice in cooler)	12 days ¹
Water	TPH Gasoline	40 mL or 125 mL glass vial, Teflon-back septum	Two (2) or Three (3); vials filled completely, no air space	Cool to 4°C (ice in cooler) HCl to pH <2	14 days ²
Water	TPH Diesel	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C (ice in cooler)	Extract within 7 days, analyze within 40 days
Water	Total Oil and Grease	1 liter amber glass bottle with Teflon-lined cap	Two (2); bottles are filled	Cool to 4°C (ice in cooler) H ₂ SO ₄ to below pH of 2	28 days
Water	Radioactivity	1 liter amber glass bottle with Teflon-lined cap	One (1); bottle is filled	HNO ₃ to pH<2 Cool to 4°C (ice in cooler)	6 months

**Table 19. Sample Containers, Handling and Preservation Protocols
for Groundwater and Soil Samples
(continued)**

Sample Matrix	Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Soil	CLP VOCs, TPH Gasoline	Airtight completely full brass or stainless steel 3- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g Mason jar	One (1)	Cool to 4°C (ice in cooler)	10 days for VOCs ¹ 14 days for TPH
Soil	CLP SOCs, CLP PCBs/ Pesticides	Airtight completely full brass or stainless steel 3- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g Mason jar	One (1)	Cool to 4°C (ice in cooler)	Extract within 10 days; analyze within 40 days ¹
Soil	Priority Pollutant Metals, plus barium, cobalt, molybdenum and vanadium (CLP Methods), pH CLP Cyanides	Acid-washed 400g Mason jar or airtight completely full brass or stainless steel 3- or 6-inch long 2.5 inch diameter tube	One (1)	Cool to 4°C (ice in cooler)	6 months, (26 days for Mercury, 12 days for cyanide, ASAP for soil pH) ¹
Soil	Hexavalent Chromium	Acid-washed 400g Mason jar or airtight completely full brass or stainless steel 3- or 6-inch long 2.5 inch diameter tube	One (1)	NA	24 hours
Soil	TPH Diesel	Airtight completely full brass or stainless steel 4- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g Mason jar	One (1)	Cool to 4°C (ice in cooler)	Extract within 14 days, analyze within 40 days

**Table 19. Sample Containers, Handling and Preservation Protocols
for Groundwater and Soil Samples
(continued)**

Sample Matrix	Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Soil	Total Oil and Grease	Airtight completely full brass or stainless steel 3- or 6-inch long, 2.5-inch diameter tube or acid-washed 400g Mason jar	One (1)	Cool to 4°C (ice in cooler)	28 days
Soil	Asbestos	Approximately 50 mL plastic jar	One (1)	NA	NA
Soil	Radioactivity	Acid-washed 400g Mason jar or airtight completely full brass or stainless steel 3- or 6-inch long 2.5 inch diameter tube	One (1)	NA	NA

Notes:

1 Holding time for CLP analyses calculated from the validated time of sample receipt (VTSR), the date on which a sample is received at the laboratory.

2 If groundwater samples effervesce with HCl preservation, HCl will not be added and the holding time will be 7 days.

ASAP Analyze as soon as possible.

NA Not applicable.

Table 20. Proposed Field QC Samples
Site Inspection Work Plan: Volume II of III

Proposed Analysis	Equipment Blanks ¹	Field Blanks ²	Trip Blanks ³	Field Duplicates ⁴
CLP VOCs	2	1	5	5
CLP SOCs	2	1	0	5
CLP PCBs/Pesticides	2	1	0	5
Priority Pollutant Metals including barium, cobalt, molybdenum and vanadium (CLP Methods)	2	1	0	5
Hexavalent Chromium	2	1	0	5
CLP Cyanide	2	1	0	5
TPH Gasoline	2	1	0	5
TPH Diesel	2	1	0	5
Total Oil and Grease	2	1	0	5
Radioactivity	-- ⁵	--	--	--

Notes:

Approximately 15 wells will be installed and sampled; sampling will take approximately one week.

- 1 Two equipment blanks per week will be submitted to the laboratory.
- 2 One field blank per week will be submitted to the laboratory.
- 3 One trip blank per day will be submitted to the laboratory, VOCs only.
- 4 One field duplicate per day will be submitted to the laboratory.
- 5 -- = QC sample analysis not proposed.

Table 21. Required Laboratory QC Samples*

Analysis	Method Blank	Matrix Duplicate	Matrix Spike	Matrix Spike Duplicate	Blank Spike	Surrogate Spike
CLP VOCs	R ¹	-- ²	R	R	--	R
CLP SOCs	R	--	R	R	--	R
CLP Pesticides/PCBs	R	--	R	R	R	R
Priority Pollutant Metals plus barium, cobalt molybdenum and vanadium (CLP methods)	R	R	R	--	R	--
Hexavalent Chromium	R	R	R	--	R	--
CLP Cyanide	R	R	R	--	R	--
TPH Gasoline	R	--	R	R	R	--
TPH Diesel	R	--	R	R	R	--
Total Oil & Grease	R	R	R	--	R	--
Radioactivity	--	--	--	--	--	--

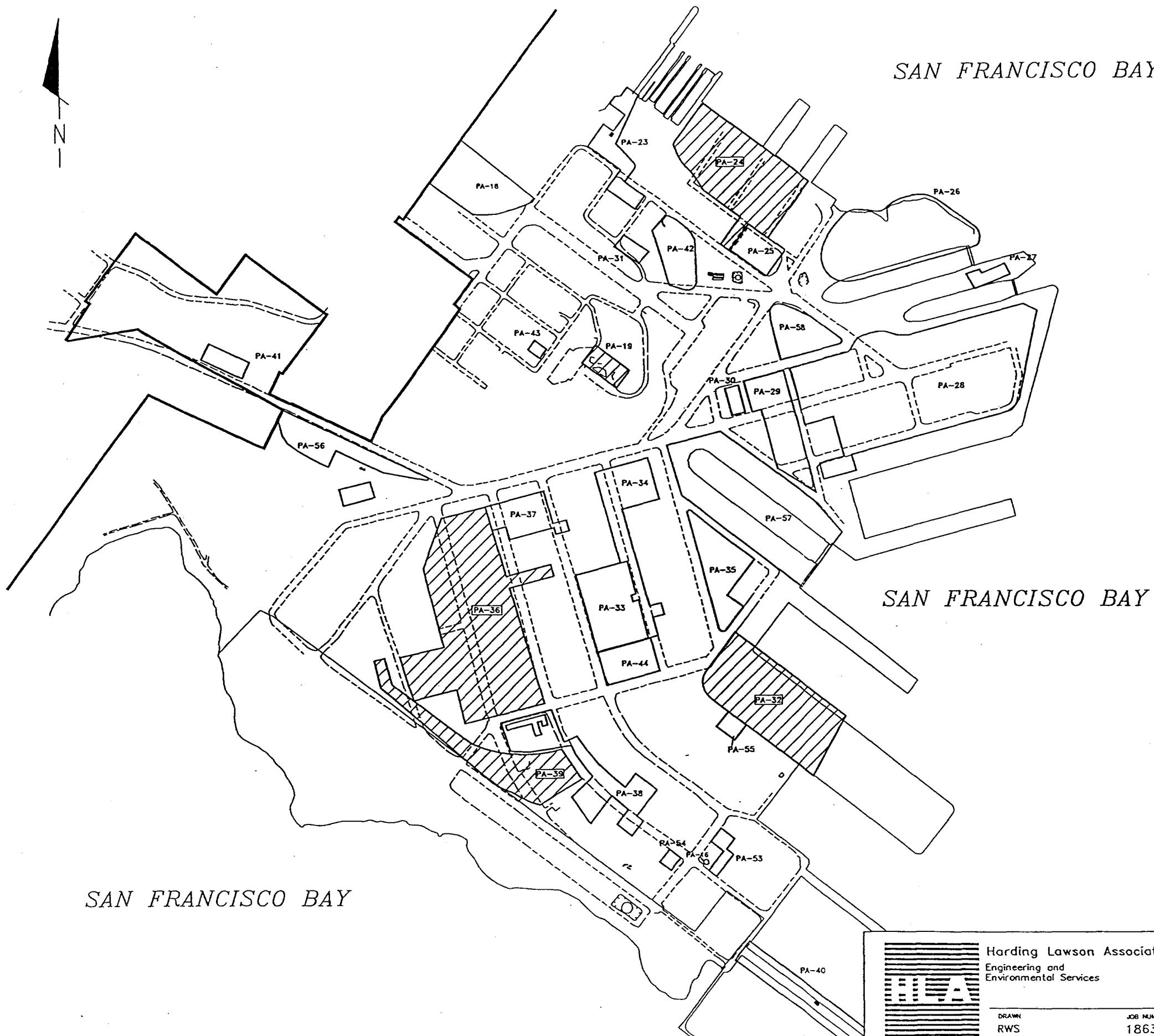
Notes:

* The sample containers, handling, and preservation protocols for laboratory QC samples are the same as those listed in Table 19. Volumes (number of containers) required for laboratory QC analyses for water samples are 2x the volumes (3x for CLP VOCs) stated in Table 19.

1 R = Required; minimum frequency is 1/20 samples. However, frequency of laboratory QC samples is dependent on the frequency of submittal and analysis; see CLP SOW and NACIP manual for specifics on frequency of laboratory QC analysis.

2 -- = Not required.

ILLUSTRATIONS



PRELIMINARY ASSESSMENT (PA) SITE

SITE PA-19, OFFICERS CLUB

SITE PA-24, BUILDINGS 124, 125,
128, 130

SITE PA-32, REGUNNING PIER AND
BUILDING 383

SITE PA-36, BUILDINGS 371, 400, 404a,
405, 406, 413, 414, 704
AND THE AREA WEST OF
BUILDING 405

SITE PA-39, BUILDINGS 505, 707

EXPLANATION



PRELIMINARY ASSESSMENT (PA)
SITE BOUNDARY AND
NUMBER

0 700
SCALE IN FEET

CAD File Name: HPA615 Last Plot Date: 11/27/91



Harding Lawson Associates
Engineering and
Environmental Services

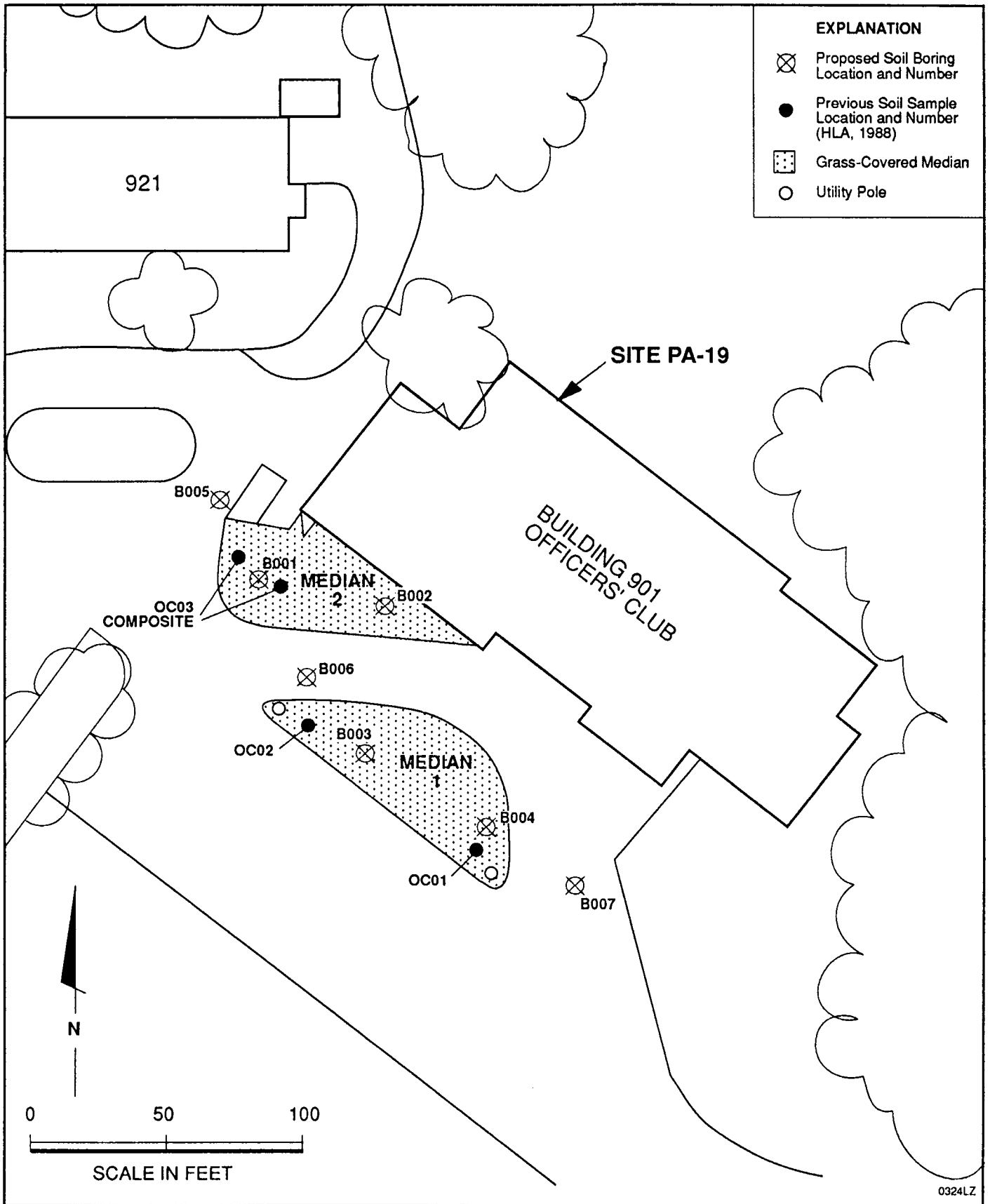
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18639,615.02

Site Location Map
Site Inspection Work Plan
PA Sites with Existing Data
Hunters Point Annex
San Francisco, California

APPROVED
MTE
DATE
11/91

PLATE
1

REVISED DATE



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Environmental Services

**Site Map and Proposed
Sampling Locations
Site Inspection - Site PA-19**
Hunters Point Annex
San Francisco, California

PLATE

2

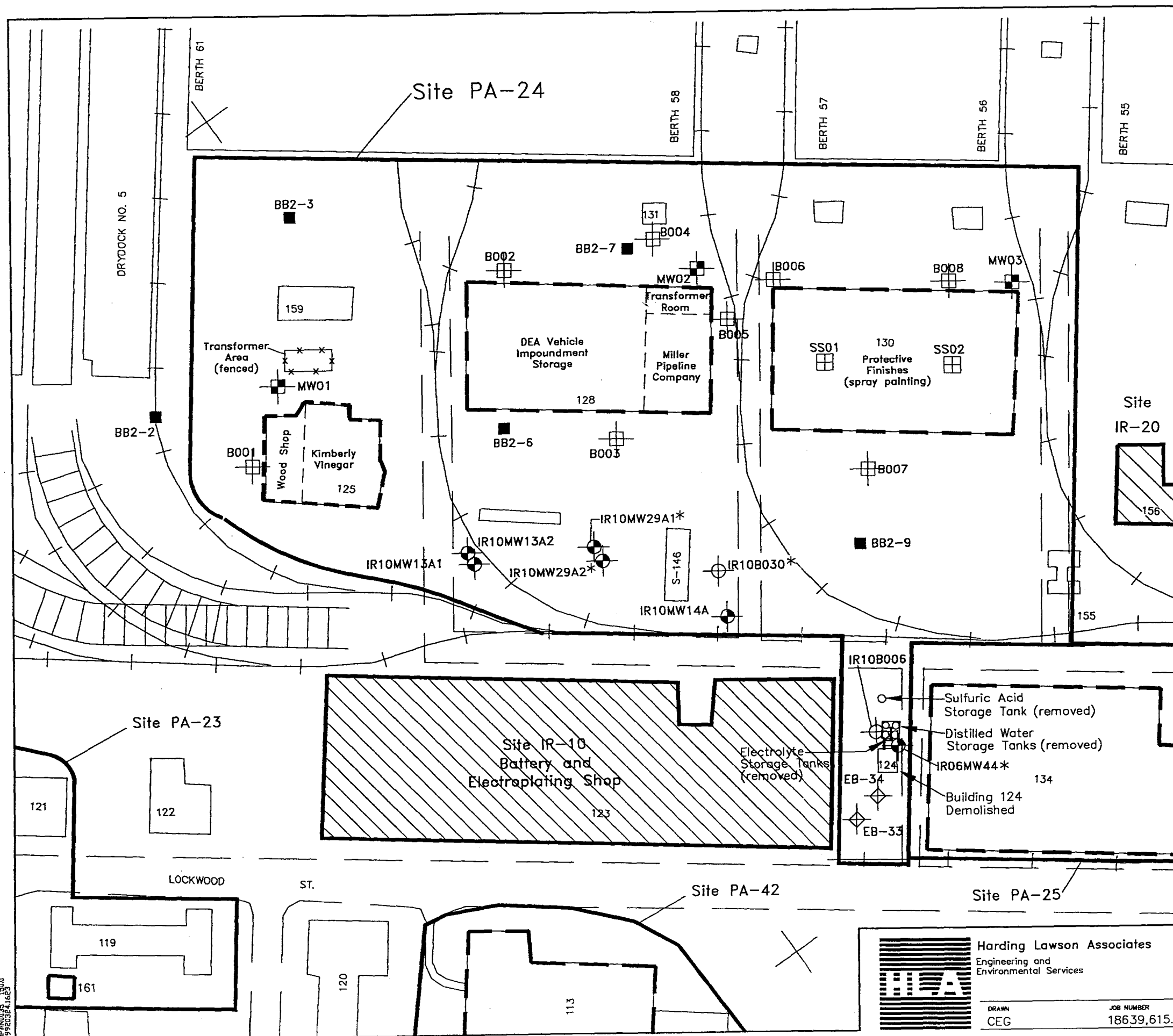
DRAWN
PGc

JOB NUMBER
18639,615.02

APPROVED
MTE

DATE
11/91

REVISED DATE



EXPLANATION

- B001 Proposed Boring Location and Number
- MW01 Proposed Monitoring Well Location and Number
- SS01 Proposed Boring Location and Number in Sump
- IR10B006 Sites IR-10 and IR-6 HLA Investigation Boring Location and Number
- IR10MW13A1 Monitoring Well Location and Number
- BB2-6 EMCON Investigation (1987) Boring Location and Number
- EB-33 Lowney and Kaldveer Investigation (1972) Geotechnical Boring Location and Number (no analytical data)
- Note: * Analytical Data from Contingency Phase Not Available
- Buildings Identified for Investigation PA, Other Areas (HLA, 1990c)
- 123 Building Number
- IR Site

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SCALE IN FEET



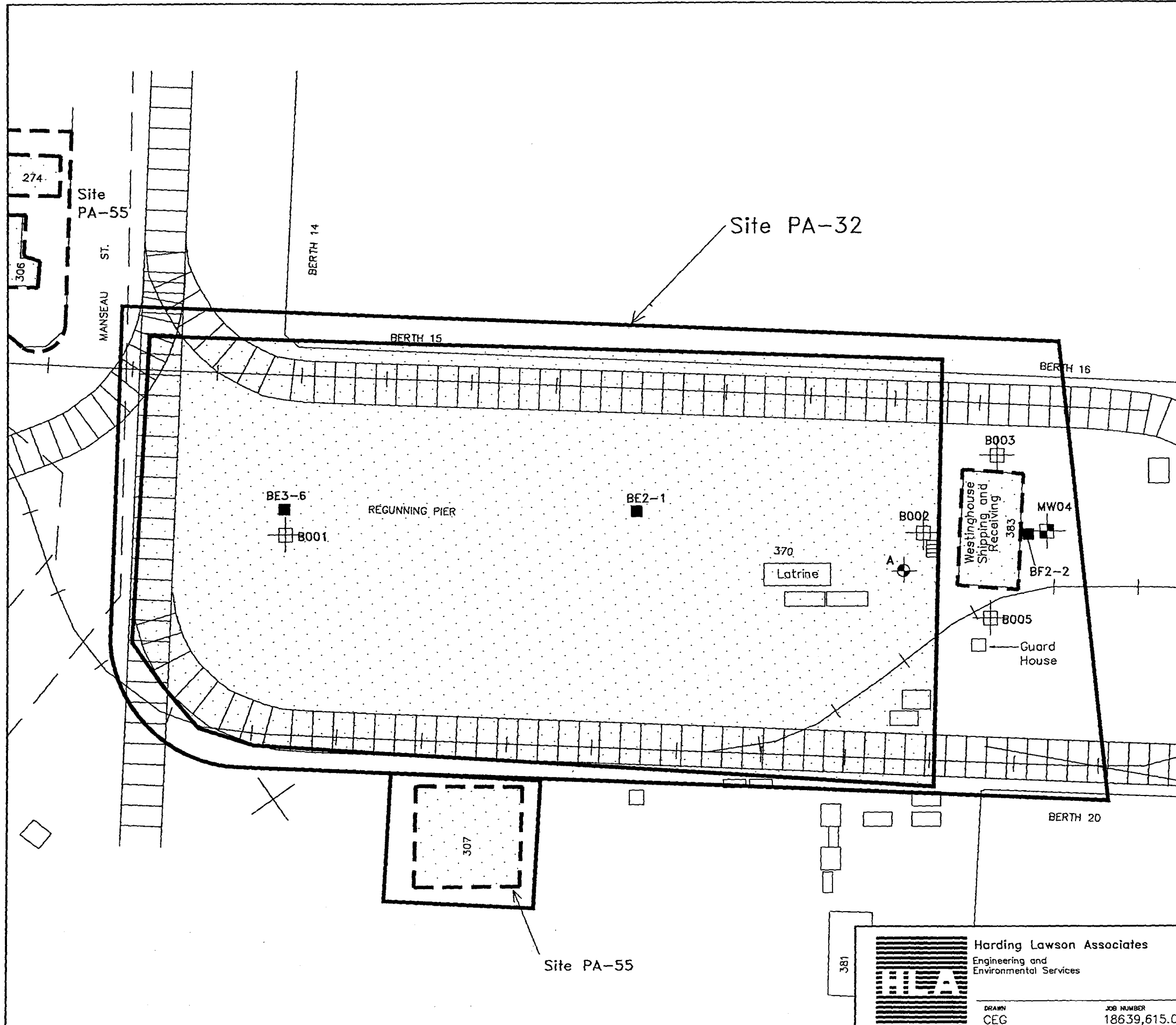
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Site Map and Proposed Sampling Locations
Site Inspection - Site PA-24
Hunters Point Annex
San Francisco, California

PLATE

3

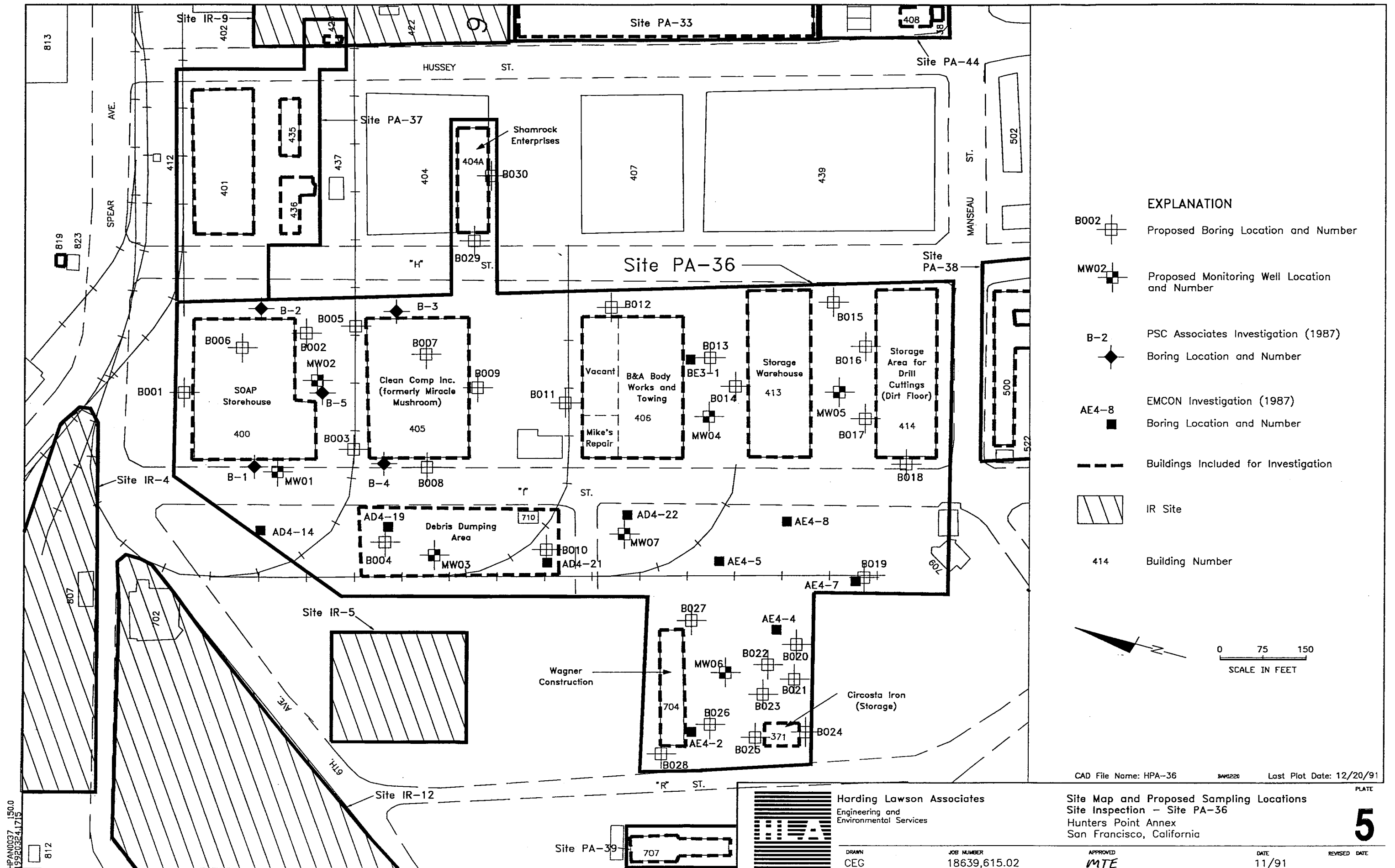
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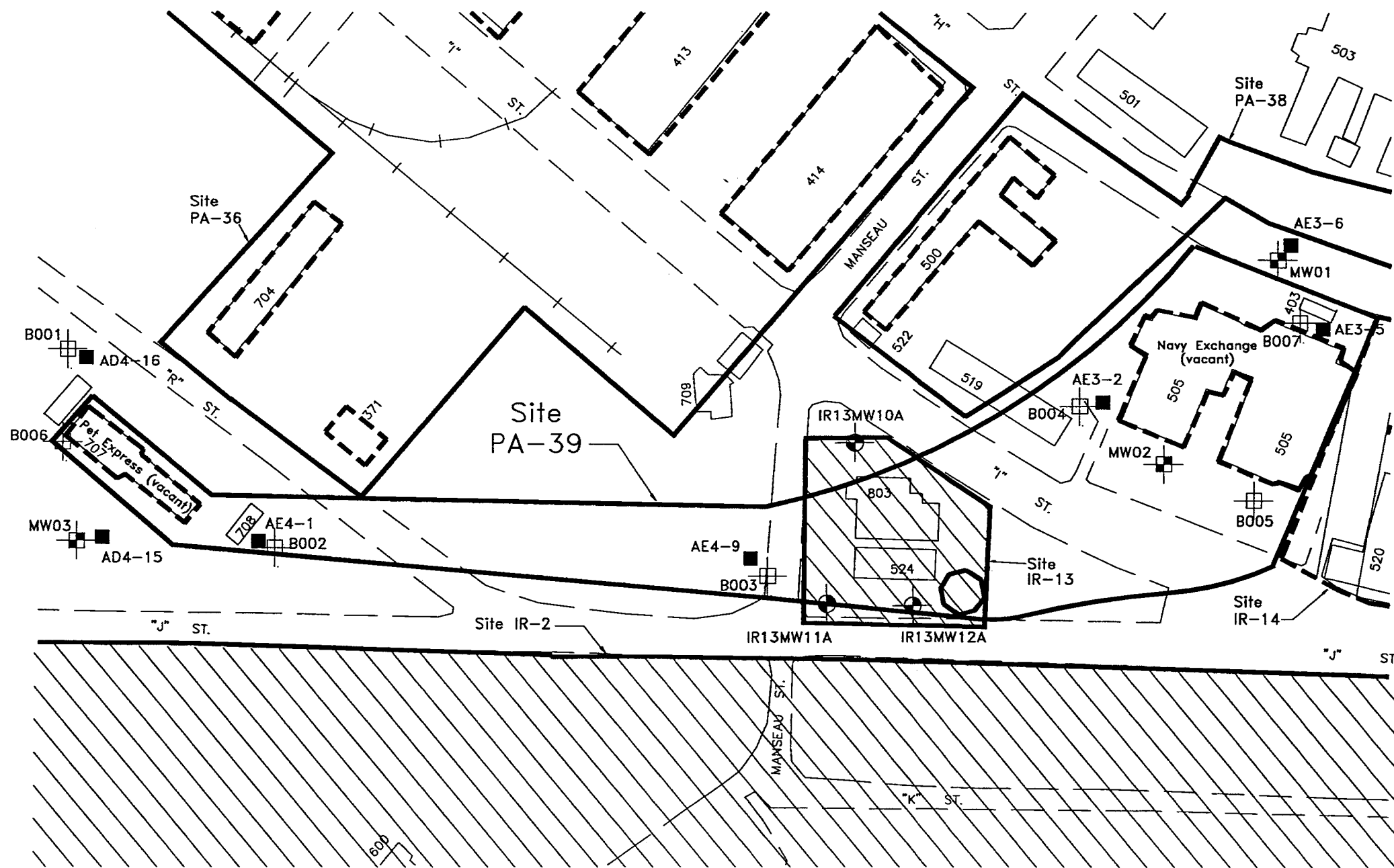


EXPLANATION

- B001 Proposed Boring Location and Number
- MW04 Proposed Monitoring Well Location and Number
- BE2-1 EMCON Investigation (1987) Boring Location and Number
- Seismic Monitoring Well (3-inch diameter, TD = 47.4 feet, Installed by the Department of Transportation for Seismic Studies)
- Sump (concrete)
- Buildings Identified for Investigation PA, Other Areas (HLA, 1990c)
- 383 Building Number

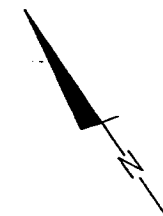
CAD File Name: HPAND036 3AM0220 Last Plot Date: 3/12/92





EXPLANATION

- B002 Proposed Boring Location and Number
- MW02 Proposed Monitoring Well Location and Number
- IR13MW10A Site IR-13, HLA Investigation (ongoing) Monitoring Well Location and Number
- AE4-1 EMCON Investigation (1987) Boring Location and Number
- Buildings Identified for Investigation PA, Other Areas (HLA, 1990c)
- 520 Building Number
- IR Site



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SCALE IN FEET



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Environmental Services

DRAWN CEG
JOB NUMBER 18639,615.02

Site Map and Proposed Sampling Locations
Site Inspection - Site PA-39
Hunters Point Annex
San Francisco, California

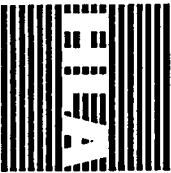
APPROVED
MTE

DATE
11/91

REVISED DATE

PLATE

6



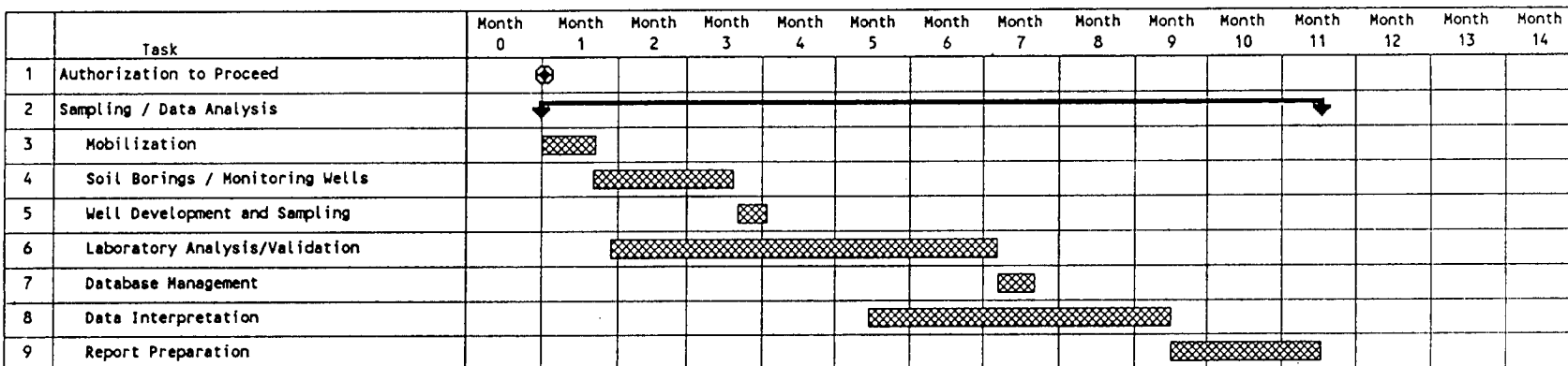
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LZ
JOB NUMBER
18639,615.02

Project Schedule
Site Inspection - Sites with Existing Data
Hunters Point Annex
San Francisco, California
APPROVED
MTE
DATE
3/92
REVISED DATE

PLATE
7

Navy CLEAN Contract N62474-88-D-5086
SI Work Plan - Volume II of III



Appendix

**NAVY RESPONSES TO AGENCY COMMENTS ON DRAFT SI WORK PLAN:
VOLUME II OF III**

**NAVY RESPONSE TO EPA COMMENTS
VOLUME II OF III**

The following are the Navy's responses to the Technical Review Comments by the United States Environmental Protection Agency (EPA), Region IX, on the Draft Site Inspection Work Plan: PA Other Areas/Utilities, Volume II of III, Sites PA-19, PA-24, PA-32, PA-36, and PA-39, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California. The EPA presented their comments in a letter to the Navy dated February 14, 1992.

Comment No. 1

Page 6, Section 1.1.2.4, Building 404A. Plate 5 does not indicate that this building is to be investigated. No dashed line surrounds this building.

Response to Comment No. 1

A dashed line will be placed around Building 404A to indicate that it will be investigated.

Comment No. 2

Page 8, Section 1.1.2.4, Area West of building 405. The rationale for including this site in the PA program would be more apparent if it was stated that this area was used for dumping, if that is the case.

Response to Comment No. 2

The text will be modified to reflect that dumping has occurred at the site.

Comment No. 3

Page 14, Section 2.3.1.3, Paragraph 1. No contingency is provided for the possible presence of saturated bedrock at PA-19. The bottled water company located to the northwest of HPA contains groundwater from a bedrock aquifer.

Response to Comment No. 3

It is stated in Paragraph 1 that "if groundwater is encountered at Site PA-19, one boring may be completed as a monitoring well". Drilling into the bedrock is beyond the scope of a SI for Site PA-19 and is not proposed.

Comment No. 4

Page 22, Section 2.4, Paragraph 1. The statement that the list of analytical procedures presented on this page will be performed for each sample does not agree with the information provided in Table 18. According to Table 18, CLP VOCs, hexavalent chromium, and CLP cyanide will not be performed for samples from PA-19.

Response to Comment No. 4

Text will be added to Section 2.4 indicating the rationale for excluding analyses for VOCs, hexavalent chromium, and CLP cyanide at Site PA-19. The following will be

added to the text: "Because no industrial activities are known to have occurred at or near Site PA-19, the presence of VOCs, hexavalent chromium, and cyanide is not anticipated, therefore, analysis for these chemicals is not proposed."

Comment No. 5

Page 22, Section 2.4, Bullet 4. This bullet states that samples will be analyzed for Priority Pollutant Metals (13 metals); however, the QAPJP (HLA, 1988b) calls for analysis by CLP protocol which includes an analyte list of 23 metals. Which is correct? The 13 Priority Pollutant metals do not include barium, cobalt, and vanadium, all of which were found in samples from one or more of these PA sites.

Response to Comment No. 5

Metals analyses will be performed using CLP methods. However, only the Priority Pollutant Metals, including barium, cobalt, molybdenum, and vanadium will be requested. The text will be revised to reflect the proposed exclusion of 7 common metals (aluminum, calcium, iron, magnesium, manganese, potassium, and sodium) from the CLP metals analyses list.

Comment No. 6

Page 22, Section 2.4, Bullet 4. The text and Table 18 do not include the information presented in Table 19 which states that molybdenum will be included in the metals analyses. Molybdenum was found in samples from one or more of these PA sites and would seem to be appropriate for inclusion in the list of analytes.

Response to Comment No. 6

Molybdenum will be included in the metals analysis for soil and groundwater. See response to Comment No. 5 above.

Comment No. 7

Page 23, Section 2.4, Paragraph 1. Contrary to the statement in the text that "analytical methods to be used are summarized in Table 18", the table does not include analytical methods for radioactivity, pH, and major anions.

Response to Comment No. 7

The analytical methods for soil pH and for measuring radioactivity will be added to Table 18. Groundwater samples will not be tested for major anions, salinity, or total dissolved solids; reference to these analyses will be deleted from Tables 19, 20, and 21.

The work plan does not propose the collection of samples for radiation analyses. Soil and groundwater samples are not expected to exhibit radiation levels above background at these PA sites. However, if a sample should exhibit radiation levels above background, it will be submitted for analyses for radioactivity and for specific radionuclides. The analytical methods used and the sample container, handling, and

preservation requirements for soil and groundwater samples will be added to Tables 18 and 19, respectively.

Comment No. 8

Page 27, Section 3.6, Paragraph 1. To provide a more useable Work Plan, the general procedure for collection of field QC samples described in Section 15.0 of the QAPjP (HLA, 1988b) should be augmented in this section with a site-specific list of QC samples to be collected. Volume I of the Work Plan provides a useful table which describes the number of blanks to be collected. In addition, the number of field duplicate groundwater samples to be collected should be described.

Response to Comment No. 8

The field QC samples will be included in Table 20. The QC samples will include trip, field, and equipment blanks, as well as field duplicates.

Comment No. 9

Page 27, Section 3.6, Paragraph 1. Table 19, referenced in this section, does not include sample container, handling, and preservation requirements for samples to be analyzed for radioactivity.

Response to Comment No. 9

Sample container, handling, and preservation requirements for soil and groundwater samples collected for radioactivity analyses will be added to Table 19.

**NAVY RESPONSES TO RWQCB COMMENTS
VOLUME II OF III**

Harding Lawson Associates

The following are the Navy's responses to comments by the California Regional Water Quality Control Board, San Francisco Bay Region, on the (1) Draft Site Inspection Workplan: PA Other Areas Utilities Volume I of III: Underground Utilities and (2) Draft Site Inspection Workplan: PA Other Areas Utilities Volume II of III: Sites PA-19, PA-24, PA-32, PA-36 and PA-39, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California. The RWQCB presented their comments in a letter dated February 3, 1992.

GENERAL COMMENTS

General Comment a.

See General Comment 1.c with respect to the determination of contaminant concentrations "above background."

Response to General Comment a.

The Navy concurs that background concentrations have not been established.

General Comment b.

General Comments 1.a and 1.b also apply here.

Response to General Comment b. (1.a)

Detection limits presented in the ESAP do not apply to this workplan. Text will be added to Section 2.4 of this work plan referencing the detection limit goals stated in QAPjP (HLA, 1988b).

Response to General Comment b. (1.b)

As stated in Section 8.1 of the QAPjP (HLA, 1988b), the pH, conductivity, and temperature will be measured for groundwater samples collected from monitoring wells. In addition, text will be added to Section 2.4 of the workplan to include field measurements of turbidity for all groundwater samples collected from monitoring wells. Although no grab groundwater samples from borings are proposed, if circumstances necessitate collection of a grab groundwater sample, the pH, conductivity, temperature, and turbidity would be measured.

SPECIFIC COMMENTS

Specific Comment a.

p. 25, Section 3.2: The agreed upon prohibition of the use of black electrical tape should be stated in the text because the sample technique described in Section 7.2 of the QAPjP (HLA, 1988) does not specifically state how the ends of the sample tubes are to be secured.

Response to Specific Comment a.

The use of electrical tape has been discontinued. The method of capping soil sampling tubes will be described in Section 3.2 of the work plan.

Specific Comment b.

P. 26, Section 3.3: The techniques for monitoring well installation and groundwater testing incorporated by reference should include modifications agreed upon in previous drafts of these and other documents, e.g., the field measurement of turbidity in all groundwater samples.

Response to Specific Comment b.

Techniques for monitoring well installations follow the QAPjP (*HLA, 1988b*) guidelines. Field measurement of turbidity during groundwater sampling is acknowledged and addressed in Section 3.3 of the work plan.

**NAVY RESPONSES TO DTSC COMMENTS
DRAFT SITE INSPECTION, OTHER AREAS, VOLUME II OF III**

Harding Lawson Associates

The following are the Navy's responses to comments by the State of California, Environmental Protection Agency, Department of Toxic Substances Control (DTSC) on the Draft Site Inspection, Other Areas, Volume II of III, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California. The DTSC presented their comments in a letter dated February 11, 1992.

GENERAL COMMENTS

Bullet 1

Holding time exceedances should be explained in the text with the data results. This is of particular concern for Boring B006 and MW13A2 results for EPA Method 7196. The reported detection limits for this method are also highly variable, thus raising questions about the validity of the reported nondetect samples.

Response to Bullet 1

Samples whose holding times for hexavalent chromium were exceeded were assigned a J5 qualifier; an explanation of each qualifier is included in Table 7. As stated in Section 13.0 of the QAPjP (*HLA, 1988b*), "The actual detection limits obtained during chemical analysis will vary depending on instrument sensitivity and matrix effects. The actual detection limits will be reported by the laboratory."

Bullet 2

The proposed sampling distribution for PA Sites 24, 32, 36 and 39 is insufficient to define extent of contamination in these areas. In general, at least three sampling points are necessary at each location of a proposed confirmational boring for PA Sites 24, 32, 26 and 39. The proposed distribution will ensure multiple contingency phases.

Response to Bullet 2

The purpose of an SI is to determine whether additional investigation is necessary, not to define the extent of contamination. This proposed work plan will provide adequate data to evaluate whether or not additional investigation is necessary.

Bullet 3

All investigations shall be planned to minimize additional contingency phases which will conflict with the current expedited schedules.

Response to Bullet 3

An SI is performed to evaluate whether additional investigation is necessary. If additional investigation is necessary, an RI will be proposed. Contingency phases are not performed as part of SI activities. If additional investigation is necessary, a work plan will be proposed and will be presented as part of the report of SI activities.

SPECIFIC COMMENTS

Comment No. 1

Section 2.3.2, PA-24; Areas with possible further investigations necessary are listed below.

Bullet 1

Borings should be proposed to define the extent of SVOCs detected in boring BB2-2.

Response to Bullet 1

See response to General Comments, second bullet.

Bullet 2

Add a boring between Borings B003 and B007 to further assess possible contamination in this "area of poor housekeeping practices".

Response to Bullet 2

The areas of poor housekeeping addressed by Borings B003 and B007 are separated by a road. See response to General Comments, second bullet.

Bullet 3

Is there any evidence of chemical releases within Building 128? If so, a boring should be added inside the building.

Response to Bullet 3

Evidence of chemical releases inside Building 128 was not observed by ERM-West (*ERM-West, 1988*) during a fence-to-fence survey of the entire facility or during subsequent site visits by HLA.

Bullet 4

Based on the groundwater flow direction near Building 130, an additional monitoring well may be necessary in the SE corner of the building due to the existence of the two sumps.

Response to Bullet 4

Groundwater flow direction near Building 130 is not known. Proposed Monitoring Wells MW02 and MW03 and existing wells at Site IR-10 will enable assessment of flow direction. The need for additional wells will be assessed following evaluation of the SI results.

Bullet 5

Provide more detailed information regarding the source investigations to be conducted to define the extent of hexavalent chromium found in the soil sample from MW13A2. Are there any records of hexavalent chromium usage in this area?

Response to Bullet 5

Monitoring Well IR10MW13A2 was installed as part of the RI for Site IR-10; analytical results will be presented in the RI report for OU II. There are no records showing hexavalent chromium usage associated with activities at Site PA-24.

Bullet 6

Will the asbestos found in Boring BB2-3 be handled under the separate facility-wide asbestos program? If not, an additional boring should be added in this area.

Response to Bullet 6

The sitewide asbestos program is being performed under a separate task order; it will not investigate asbestos fibers detected in soil samples collected from soil borings. An additional boring is not proposed near Emcon Boring BB2-3, however, soil Boring B004 is proposed near Emcon Boring BB2-7, which contained 1 to 10 percent manmade asbestos fibers. See response to General Comments, second bullet.

Bullet 7

Additional investigations may be required near Boring B006 and MW44 based on contingency results.

Response to Bullet 7

Boring IR10B006 and Monitoring Well IR10MW44A were drilled during the RI for Site IR-10. Analytical results obtained from soil and groundwater samples collected from Boring IR10B006 and Monitoring Well IR10MW44A will be evaluated as part of the RI at Site IR-10. The data have also been assessed with respect to past activities reported at Building 124. Based on this assessment, additional sampling is not warranted as part of SI activities at Site PA-24.

Comment No. 2

Section 2.3.3, PA-32; Provide greater detail of any radioactivity studies to be completed within PA-32, as the past activities of the regunning pier included the storage of containers containing radioactive materials. Will groundwater monitoring in this area include analyses for radioactivity?

Response to Comment No. 2

As stated in Section 2.4 of the Work Plan, "soil and groundwater samples will be screened for beta and gamma radiation". In addition, if radiation levels are above background then "the sample will be submitted for laboratory analysis for gross alpha, beta, and gamma radiation as well as for radionuclide identification." Soil and groundwater samples will not be collected and analyzed for radiation unless field screening indicates that radiation levels are above background.

Comment No. 3

Section 2.3.3.3, PA-32; Add additional exploratory borings around Boring BE3-6.

Response to Comment No. 3

See response to General Comments, second bullet.

Comment No. 4

Section 2.3.4, PA-36; Reference is made to a leaking drum on the north side of Building 413. How has this been remediated?

Response to Comment No. 4

Based on a site visit by HLA on March 10, 1992, the drum has not been removed and appears to be leaking. The Navy was informed of the location and apparent condition of the drum on March 10, 1992. A procedure will be implemented by the Navy for reporting minor releases to the appropriate authorities at HPA. These reporting procedures will apply to field conditions which result in minor releases to the environment. In general, these conditions arise from poor housekeeping practices.

Comment No. 5

Section 2.3.4.4, PA-36; Again, as mentioned in the general comments, additional borings are required to define extent of contamination (e.g. near Borings AE4-7, BE3-1, B-1, B-2, B-3, B-4, B-5, AD4-14, AD4-22, AE4-5, AE4-8, AE4-7).

Response to Comment No. 5

See response to General Comments, second bullet.

Comment No. 6

Section 2.3.5, PA-39; Please explain how the two unknowns identified in Boring AE4-9 were quantified, given that the laboratory stated that they were not able to identify them.

Response to Comment No. 6

A chemical can be quantified using standard laboratory techniques, even though it has not been positively identified. Reference to the two unknowns identified in Boring AE4-9 can be found in the EMCON report (*EMCON, 1987*).

Comment No. 7

Section 2.3.5, PA-39; As mentioned in the general comments, additional borings are required to define extent of contamination (e.g. near Borings AE4-9, AD4-16, AD4-15, AE4-1, AE3-5, AE3-6, and AE3-2).

Response to Comment No. 7

See response to General Comments, second bullet.

Comment No. 8

Plate 7, Schedule; This schedule should also be included in the discussions between the Navy and regulatory agencies starting on February 21, 1992. 27 weeks is unacceptable for laboratory analysis and validation.

Response to Comment No. 8

As shown on Plate 7 and as stated in Section 4.0 of the work plan, the duration of field activities is eleven weeks. In addition, all analytical cursory validation, and full validation results are to be received by the end of the twenty-ninth week. This allowed for 18 weeks to complete laboratory analyses and data validation after the last samples were collected, not 27 weeks. However, the assumption of 18 weeks to receive analytical and data validation results has been revised to 13 weeks. Plate 7 will be revised to reflect this change and will be reformatted to appear similar to Plate 25 of Volume I of this work plan.

DISTRIBUTION

**DRAFT FINAL
SITE INSPECTION WORK PLAN: PA OTHER AREAS/UTILITIES
VOLUME II OF III: SITES PA-19, PA-29, PA-32, PA-36, AND PA-39
NAVAL STATION, TREASURE ISLAND
HUNTERS POINT ANNEX
SAN FRANCISCO, CALIFORNIA
March 31, 1992**

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QUALITY CONTROL REVIEWER



R. Bruce Scheibach
Registered Geologist No. 5062